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Reclaiming Our Future: International Efforts to Eliminate the Threat of Persistent Organic Pollutants

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Reclaiming Our Future: International Efforts to Eliminate the Threat of Persistent Organic Pollutants

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I. Introduction

Evidence is mounting that certain types of chemicals known as persistent organic pollutants ("POPs") are causing increasingly detrimental health and environmental effects around the world.[1] The international community has become concerned in recent years about the severity of the adverse effects of POPs and their continued global distribution. Scientists link POPs not only to increased incidences of cancer in humans and wildlife, but also to birth defects, compromised immune systems, hormonal abnormalities, and neurological defects.[2] Because POPs are transported by wind, ocean currents, and by migrating wildlife, the potential effects of POPs are global in scope.[3]

POPs are produced or released during industrial processes which utilize chlorine, or the combustion of waste and certain fuels, or by the manufacture, use, and storage of chemicals such as organochlorine pesti-

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1. Persistent organic pollutants are toxic organic compounds that break down very slowly in the environment and accumulate in the tissues of living organisms. *Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities*, United Nations Environment Programme ("UNEP"), at 37-38, U.N. Doc. UNEP (OCA)/LBA/IG.2/7 (1995) [hereinafter *"Global Programme of Action"*]; INTERNATIONAL EXPERTS MEETING ON PERSISTENT ORGANIC POLLUTANTS: TOWARDS GLOBAL ACTION, MEETING STATEMENT 2 (June 1995) (on file with author) [hereinafter "VANCOUVER MEETING STATEMENT"]; PESTICIDE ACTION NETWORK ASIA AND THE PACIFIC, POPs SUMMARY 1-2 (1996) [hereinafter "POPs SUMMARY"].

2. THEO COLBORN ET AL., OUR STOLEN FUTURE: ARE WE THREATENING OUR FERTILITY, INTELLIGENCE, AND SURVIVAL? A SCIENTIFIC DETECTIVE STORY 26, 154-55, 180-82, 187-91 (1996); POPs SUMMARY, *supra* note 1, at 1-2.

3. *Global Programme of Action*, *supra* note 1, at 38; COLBORN, *supra* note 2, at 105; POPs SUMMARY, *supra* note 1, at 1-2.

cides.[4] Examples of POPs include DDT, chlordane, toxaphene, endosulfan, and various other pesticides, as well as industrial products (PCBs) and byproducts (dioxins and furans).[5]

Various groups have begun an effort to formulate a uniform international policy to deal with the worldwide health and environmental problems posed by POPs. These groups argue that a binding international instrument is needed to stop the production and use of certain POPs. In 1998, governments from around the world will almost certainly begin formal negotiation of a global legally binding instrument aimed at the eventual worldwide ban on production and use of POPs. This Note (1) briefly reviews the mounting evidence concerning the harmful effects of POPs; (2) discusses those international efforts that have attempted to formulate an international agreement to limit the spread of POPs; (3) compares the current POPs negotiations to the circumstances surrounding the creation of the Montreal Protocol; and (4) summarizes outstanding issues and identifies possible impediments to reaching a global consensus and effectively implementing an agreement on POPs.

II. Persistent Organic Pollutants

A. *Evidence of POPs' Global Effects*

POPs are synthetic chemicals that resist breakdown and accumulate in human body fat.[6] Once absorbed by a living organism or sprayed on a

4. *Global Programme of Action*, *supra* note 1, at 38; POPs SUMMARY, *supra* note 1, at 1; Marcia Ishii-Eiteman, Pesticide Action Network North America, Persistent Organic Pollutants: A Brief Overview of International Activities 1 (1996) (unpublished manuscript, on file with author).

5. POPs SUMMARY, *supra* note 1, at 1-2. Polychlorinated biphenyls ("PCBs") are a family of chemicals, introduced in 1929, used in many industrial processes (particularly in the electrical industry) and consumer products. Evidence of their toxic effects began to emerge in 1936, and eventually PCBs were found to accumulate and resist breakdown in the environment. In 1976, the United States and, eventually, other industrial countries banned the manufacture of PCBs. However, the ban did not address existing PCBs which had already contaminated the environment after five decades of production, nor did it prohibit certain continued uses of PCBs. COLBORN, *supra* note 2, at 89-91. See *infra* text accompanying notes 146-61 for discussion of dioxins and furans.

6. *Problems With Persistent Organic Pollutants–Towards Better Alternatives*, Intergovernmental Forum on Chemical Safety, at 3, IFCS/EXP.POPs.13 (June 6, 1996) (prepared by Consumers International et al., presented at the Intergovernmental Forum

crop, these chemicals quickly pass through the food chain, increasing their concentration in each transfer.[7] Pesticides in particular are a "special class" of POPs in that they are designed to poison and kill and are intentionally dispersed into the environment.[8] Many POPs are highly toxic, cause certain forms of cancer, or disrupt hormonal development.[9] Years ago, scientific studies linked synthetic chemicals to cancer in wildlife and humans.[10] More recent animal research has revealed an even greater variety of detrimental effects that POPs cause within the environment. These effects include: (1) sterility in bald eagles; (2) altered nesting patterns and population declines in birds exposed to DDT; (3) severe deformities of chicks exposed to dioxin; (4) reproductive failures of mink, whales, and other wildlife; (5) decline in otter population; (6) genital abnormalities in alligators; and (7) a plague among Mediterranean dolphins exposed to PCBs.[11] These harmful effects are not limited to wildlife but can harm the human species as well, as indicated by studies documenting genital abnormalities and decreases in fertility among humans.[12]

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on Chemical Safety ("IFCS") Experts Meeting on POPs, Manila, Philippines, June 17-19, 1996) (on file with author) [hereinafter "*Better Alternatives*"]; COLBORN, *supra* note 2, at 26.

7. RACHEL CARSON, SILENT SPRING 22-23, 46-49 (1962); COLBORN, *supra* note 2, at 26-27, 106-08, 154, 156; POPS SUMMARY, *supra* note 1, at 1.

8. COLBORN, *supra* note 2, at 138; Robert L. Paarlberg, *Managing Pesticide Use in Developing Countries*, *in* INSTITUTIONS FOR THE EARTH 309, 309-10 (Peter M. Haas et al. eds., 1993).

9. CARSON, *supra* note 7, at 23-27 (discussing toxicity of chlordane, heptachlor, dieldrin, aldrin, and endrin, all POPs pesticides); POPS SUMMARY, *supra* note 1, at 1; Marion Moses, *Pesticides*, *in* PUBLIC HEALTH AND PREVENTIVE MEDICINE 479, 482-83 (J.M. Last & R.B. Wallace eds., 13th ed. 1992) (describing toxicology of "chlorinated hydrocarbon" (organochlorine) pesticides) [hereinafter "*Pesticides*"]. For a recent and comprehensive narrative regarding connections between synthetic chemicals and cancer, see generally SANDRA STEINGRABER, LIVING DOWNSTREAM: AN ECOLOGIST LOOKS AT CANCER AND THE ENVIRONMENT (1997).

10. COLBORN, *supra* note 2, at 15-16, 19, 200-01; STEINGRABER, *supra* note 9, at 110.

11. COLBORN, *supra* note 2, at 1-4, 6-10, 12, 14, 144-47; *see also* STEINGRABER, *supra* note 9, at 132-34 (noting links between DDT, PCBs, chlordane, and toxaphene (all POPs) and tumors and reproductive problems in beluga whales).

12. COLBORN, *supra* note 2, at 172-79, 232-34. Animal research on the effects of POPs is directly relevant to determining how POPs may affect humans. Scientists have already determined, for example, that parallels exist across species, including humans, in endocrine systems and hormonal effects. Thus, criticism of animal studies regarding

POPs have been known to cause harm from one generation to the next (e.g., a woman who is exposed to POPs may not suffer any symptoms but her exposure may affect the hormonal development of her child before it is born).[13] This ability to disrupt the human endocrine system has led to POPs being labeled "endocrine disrupters."[14] Endocrine disruption caused by synthetic chemical residues in humans has been shown to lead to the following:[15] (1) low fertility rates and sperm counts; (2) behavioral changes; (3) impairments in learning ability; (4) disrupted neurological development; (5) genital abnormalities; (6) certain hormone-related forms of cancer, including breast, testicular, and prostate cancers;[16] (7) immune system disruption; (8) skewed hormone ratios; (9) internal reproductive organ disruption; (10) inadequate levels of thyroid hormone, which plays a role in reproduction and the development of healthy offspring; (11) ectopic (tubal) pregnancies; (12) endometriosis (a

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POPs has even less viability than similar attacks on animal studies regarding cancer. *Id.* at 86, 110, 168-69, 238. The complexities of cancer cells still leave much to be determined regarding the effects on laboratory animals as opposed to humans. *Id.* In short, scientists have more knowledge regarding how hormones work than how cancer cells work. *Id.*

13. CARSON, *supra* note 7, at 23; COLBORN, *supra* note 2, at 26-28.

14. Scientists have identified at least 51 synthetic chemicals that disrupt the endocrine system, one of the human body's fundamental networks. The endocrine system circulates messages between various glands, organs, and tissues to regulate hormone levels. COLBORN, *supra* note 2, at 32-33, 81. *See also* WORLD WIDE FUND FOR NATURE INTERNATIONAL, A FRAMEWORK CONVENTION FOR THE PHASE-OUT AND ELIMINATION OF POPS 6-7, Appendix B (1996) (providing examples of endocrine disruption) [hereinafter "WWF POSITION PAPER"]. Additionally, many forms of cancer are related to hormone regulation, and thus, endocrine disruption is directly relevant to cancer research as well. STEINGRABER, *supra* note 9, at 110-11. Endocrine disruption continues to be a controversial area of scientific research. *See generally* COLBORN, *supra* note 2. As stated by a leading scientist in this field,

> Exposure to a hormone-disrupting chemical before birth does not produce just a single clear-cut effect.... A foreign chemical can derail development in a variety of ways that will become evident at different times. For example, a boy exposed before birth to chemicals that mimic estrogen may have undescended testicles at birth, a low sperm count at puberty, or testicular cancer in middle age because of this prenatal hormone disruption. These are effects that manifest themselves in many shades of gray rather than in the black-and-white distinctions made between health and illness.

Id. at 207.

15. COLBORN, *supra* note 2, at 72 (diagramming hormonal effects of synthetic chemicals).

16. *Id.* at 182-86, 201.

disease which is a leading cause of infertility in women); and (13) miscarriages.[17]

Scientific research regarding DES led to a greater understanding of the manner in which POPs can harm humans. This research found:[18]

1. Drugs and chemicals that have little effect on an adult can cause serious and permanent damage to that adult's baby during its prenatal development.

2. Healthy embryonic development is dependent on a delicate balance of hormones which exists during prenatal development. During certain critical stages, even the slightest change in a hormonal level can interfere with this delicate balance and thereby harm the fetus.[19]

3. The human body can mistake a man-made chemical for a hormone.

4. Invisible damage to cells and tissue, although not as dramatic as visible birth defects (such as missing limbs), can have lifelong impact and undermine an individual's potential for survival.[20]

5. Chemicals can enter the placenta and disrupt prenatal development, having potentially serious effects that might not be evident until decades later.[21] Such delayed, long-term effects might not emerge until the child reaches puberty or even adulthood.

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17. *Id.* at 172-76, 178-82.

18. *Id.* at 66-67. DES (diethylstilbestrol) was introduced in 1938, and thereafter, doctors widely prescribed it for pregnant women to prevent miscarriages and to promote the strength and health of the unborn baby. Doctors also prescribed DES to treat a host of other symptoms, and farmers used it in animal feed to fatten their livestock. *Id.* at 48. By 1971, scientists had linked DES taken by pregnant women to cancer in their adult daughters. *Id.* at 52, 55. DES is now recognized as a hormone mimicker. *Id.* at 72-73. For a description of damage caused by DES, see *id.* at 55-66.

19. *See also* STEINGRABER, *supra* note 9, at 142-43 (noting that slight environmental changes caused by chemicals can affect fetal development of turtles, including sex determination).

20. One scientist notes that "[u]ntil DES, most scientists thought a drug was safe unless it caused immediate and obvious malformations. They found it hard to believe that something could have a serious long-term impact without causing any outwardly visible birth defects." COLBORN, *supra* note 2, at 53.

21. *See also* CARSON, *supra* note 7, at 23 (discussing DDT's ability to "cross the barrier of the placenta, the traditional protective shield between the embryo and harmful substances in the mother's body.").

Scientists have discovered that numerous chemicals are hormone disrupters.[22] The difference between natural and synthetic hormone disrupters lies in their persistence. Natural hormone disrupters, such as plant estrogens, may be eliminated from the body within one day. However, the human body cannot break down synthetic hormone disrupters; they accumulate in body tissue, ensuring long-term exposure.[23]

Although scientific evidence regarding POPs is far from complete,[24] the tremendous weight of evidence points to the potential for POPs to harm each of us, our children, grandchildren, and generations to come. Whether the harm caused by POPs manifests itself through a child's deformity or learning disability, infertility, or cancer, POPs pose a major threat to biodiversity on the planet.[25]

B. Prevalence of POP Contamination

Exposure to POPs began with the onset of the chemical age over half a century ago and has increased steadily until the present.[26] The use of POPs has grown because chemicals such as pesticides and fertilizers promote short-term economic efficiency by increasing agricultural production at a relatively low cost.[27] The sale and distribution of chemicals are also big business. For example, the world market in pesticides amounted to five billion pounds in 1989 and included 1,600 chemicals.[28]

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22. COLBORN, *supra* note 2, at 81. At least forty synthetic chemicals are capable of mimicking the hormone estrogen. STEINGRABER, *supra* note 9, at 111.

23. COLBORN, *supra* note 2, at 82.

24. For example, scientists are in the process of discovering additional effects that POPs have on the migratory patterns of birds. *Id.* at 164, 170.

25. *See id.* at 165-66.

26. *Id.* at 138, 170-71.

27. *See generally* CONSUMERS ASSOCIATION OF PENANG, PESTICIDE PROBLEMS, LEGISLATION AND CONSUMER ACTION IN THE THIRD WORLD: THE MALAYSIAN EXPERIENCE (1991) [hereinafter "PESTICIDE PROBLEMS"]; LORI ANN THRUPP, BITTERSWEET HARVESTS FOR GLOBAL SUPERMARKETS: CHALLENGES IN LATIN AMERICA'S AGRICULTURAL EXPORT BOOM (1995) [hereinafter "BITTERSWEET HARVESTS"]; DAVID WEIR & MARK SCHAPIRO, CIRCLE OF POISON (1981) [hereinafter "CIRCLE OF POISON"] (all discussing the cyclical pattern of pesticide use). See *Better Alternatives*, *supra* note 6, at 4-5 for a summary of the current uses for POPs. *But see* Lori Ann Thrupp, *New Harvests, Old Problems: Feeding the Global Supermarket*, GLOBAL PESTICIDE CAMPAIGNER, Sept. 1995, at 1, 4-6 (describing adverse economic, social, and environmental impacts of heavy pesticide use in less developed countries ("LDCs")) [hereinafter "*New Harvests*"].

28. COLBORN, *supra* note 2, at 138.

In 1993, total sales of the top twelve agrochemical companies worldwide reached over nineteen billion dollars.[29] Worldwide use is still increasing, particularly in developing countries.[30]

The need for global action against POPs is highlighted by the fact that POPs which are banned in one locale often find their way to another.[31] Between 1991 and 1994, the United States exported at least fifty-eight million pounds of pesticides that had been banned, canceled, or voluntarily suspended for use in the United States, including ninety-six tons of DDT in 1991 alone.[32] In 1991, exports from the United States

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29. THE PESTICIDES TRUST, THE PESTICIDE TRAIL: THE IMPACT OF TRADE CONTROLS ON REDUCING PESTICIDE HAZARDS IN DEVELOPING COUNTRIES 24 (Barbara Dinham ed., 1995) [hereinafter "THE PESTICIDE TRAIL"].

30. COLBORN, *supra* note 2, at 138; THE PESTICIDE TRAIL, *supra* note 29, at 23-36 (reviewing the global pesticide market); *see generally* DR. G. GOULSTON, CROP PROTECTION IN LATIN AMERICA (1996) (analyzing the pesticide markets in Latin America). *See also* STEINGRABER, *supra* note 9, at 161-67 (describing domestic regulation of pesticides, or the lack thereof, in the United States).

31. *See Better Alternatives*, *supra* note 6, at 5; PESTICIDE PROBLEMS, *supra* note 27, at 7-9; Carl Smith, *Countries Accept "Dirty Dozen" Pesticides from U.S. Shippers Despite National Bans*, GLOBAL PESTICIDE CAMPAIGNER, Sept. 1995, at 3, 17 (noting the export of banned pesticides from industrialized countries to LDCs).

32. COLBORN, *supra* note 2, at 110; Smith, *supra* note 31, at 3. The history of DDT use provides a useful example of the growth of POPs. DDT (dichlorodiphenyltrichloroethane) is an insecticide which was hailed as a miracle when introduced in 1938. Widespread use of DDT in the United States began in 1947. Decades later, in 1972, recognition of DDT as a cancer-causing chemical led to severe restrictions on its use in the United States. COLBORN, *supra* note 2, at 68-70, 198-202. Significant amounts of DDT continue to be exported by chemical companies in developed countries to LDCs. *Better Alternatives*, *supra* note 6, at 5; Ishii-Eiteman, *supra* note 4, at 1. DDT is used widely in LDCs such as Indonesia to eradicate malaria and other mosquito-transmitted diseases. *See Better Alternatives*, *supra* note 6, at 4-5, 19-20; PESTICIDE PROBLEMS, *supra* note 27, at 49; *see also* Position Paper presented to the World Health Assembly by Pesticide Action Network and Consumers International (Jan. 1997) (presented to the World Health Assembly 99th Executive Board, Provisional Agenda Item 5.4, Jan. 13-17, 1997) (stating that the World Health Organization regards DDT as a chemical that is necessary for use in the control of insect-borne diseases) [hereinafter "PAN/CI Position Paper"]. Because of this one redeeming use for this particular POP, language providing for an exception to a ban on DDT, despite its toxicity, may be considered by the drafters of the POPs agreement. *See IFCS Ad Hoc Working Group on Persistent Organic Pollutants Meeting Final Report*, Intergovernmental Forum on Chemical Safety, at 10, IFCS/WG.POPs/REPORT.1 (July 1, 1996) [hereinafter "*Final Report*"]. Some LDCs have halted their use of DDT, and others are in the process of phasing it out while alternatives are introduced. PAN/CI Position Paper, *supra*. Environmental nongovernmental organizations ("NGOs") such as Pesticide Action Network ("PAN") advocate a rapid phaseout of this toxic pesticide. *Id.* These NGOs (PAN, World Wide Fund

included fifty-five tons per day of compounds known to be endocrine disrupters.[33]

C. *Areas of Controversy*

Because so many POPs are used globally and vast numbers of new synthetic chemicals continue to be created, it is very difficult for scientists to isolate a single POP as the cause of a particular symptom.[34] POPs often act in combination.[35] Indeed, a fully inclusive list of all POPs has yet to be compiled, and considerable controversy surrounds the issue of which chemicals should be included on the list of substances to be banned.[36]

Furthermore, some critics argue that synthetic POPs pose no danger to humans because humans have adapted to certain natural (non-synthetic) hormone disrupters.[37] A leading scientist responds that "while we may have evolved ways to coexist with [natural hormone disrupting] compounds, this does not mean they are harmless .... Even naturally occurring hormone mimics can disrupt development of the unborn or young children."[38] Furthermore, as noted above, synthetic POPs pose an even greater hazard than natural compounds because they can persist in the body for years, while plant estrogens might be eliminated within a day.[39]

Some critics also question the relevance of DES studies to the POPs issue because of the very high doses of DES given to pregnant women

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for Nature, and Consumers International) plan to prepare a report regarding DDT to present to the POPs Intergovernmental Negotiating Committee ("INC") when it is formed in 1998. *See* Memorandum from Ronald Macfarlane, Pesticide Action Network Asia and the Pacific, to Pesticide Action Network North America 4 (Mar. 17, 1997) (on file with author).

33. Smith, *supra* note 31, at 3; *see also* COLBORN, *supra* note 2, at 138 (providing statistics of pesticide production and export).

34. COLBORN, *supra* note 2, at 110, 137-41 (asserting that contamination from POPs is global and well documented), 18 (pointing out that new chemicals are created much faster than toxicologists can demonstrate links between individual chemicals and cancer).

35. *Id.* at 178.

36. *Id.* at 78, 81, 178; *see infra* text accompanying notes 127-45.

37. COLBORN, *supra* note 2, at 82.

38. *Id.*

39. *Id.* at 81-82.

and to laboratory animals in experiments.[40] On the other hand, recent studies utilizing very low doses of DES have produced results similar to those of studies in which large doses were applied.[41]

Finally, critics question the accuracy of using animal studies to forecast dangers posed to humans. Opponents note that it is well established that similarities in endocrine systems have existed across many species throughout evolution.[42] Therefore, the link between animals and humans in this area cannot be ignored. As Rachel Carson noted over thirty years ago, "in nature nothing exists alone.... Man, however much he may like to pretend the contrary, is part of nature."[43]

III. International Efforts

A. *Earth Summit, Rio de Janeiro, June 1992*

The first international forum which recognized the need to address the harmful effects of POPs was the United Nations Conference on Environment and Development ("UNCED") Earth Summit in Rio de Janeiro, Brazil in June 1992 ("Rio Earth Summit"). At that summit, more than 170 governments agreed to work to eliminate the emissions and discharge of certain synthetic compounds.[44] Among the results of the Rio Earth Summit, one written agenda entitled "Environmentally Sound Management of Toxic Chemicals" (Chapter 19 of Agenda 21) became

40. *Id.* at 169.

41. *Id.* at 169-70. While effects increase with dosage up to a point, at that point, the response to DES diminishes as the dose increases. *Id.*

42. *Id.* at 74, 110, 167-69. Animal studies regarding hormone effects offer a much higher degree of certainty than cancer studies. Scientists have extensive knowledge of how hormones work, whereas knowledge regarding cancer cells is limited. *Id.* at 86, 110, 168-69; *see supra* note 12.

43. CARSON, *supra* note 7, at 51, 188.

44. U.N. DEP'T OF PUBLIC INFORMATION, AGENDA 21: PROGRAMME OF ACTION FOR SUSTAINABLE DEVELOPMENT, June 3-14, 1992, para. 17.28 (d)-(e), *reprinted in* AGENDA 21: THE UNITED NATIONS PROGRAMME OF ACTION FROM RIO, at 151, U.N. Sales No. E.93.I.11 (1993) [hereinafter "AGENDA 21"]; Response Strategies for Reducing/Eliminating Certain Persistent Organic Pollutants (POPs) 3 (June 10, 1996) (discussion paper presented by the Nordic Countries and the United States at the IFCS meeting in Manila, Philippines, June 21-22, 1996) (on file with author) [hereinafter "Response Strategies"]; *see* Introductory Note at the United Nations Conference on Environment and Development, Rio de Janeiro, June 3-14, 1992, 31 I.L.M. 814, 815 (1992).

the primary instrument for coordinating international efforts regarding chemicals.[45] The Rio Earth Summit's Agenda 21 established two mechanisms to promote and implement provisions regarding chemical safety: (1) the Intergovernmental Forum on Chemical Safety ("IFCS"); and (2) the Inter-Organisational Programme for the Sound Management of Chemicals ("IOMC").[46] Additionally, at the Rio Earth Summit, the United Nations Environment Programme ("UNEP") was authorized to convene a global conference regarding POPs.[47]

B. UNEP Governing Council Meeting, 1995

In May 1995, the UNEP Governing Council's Decision 18/32 established a procedure to expeditiously address the need for global action on POPs.[48] Specifically, Decision 18/32 requested that a series of meetings of experts and an ad hoc working group be convened by the IOMC, the International Programme on Chemical Safety ("IPCS"), and the IFCS.[49] These groups were instructed to "assess realistic response strategies, policies and mechanisms for reducing and/or eliminating

45. AGENDA 21, *supra* note 44, ch. 19, at 186-96; Response Strategies, *supra* note 44, at 5. The June 1996 Final Report of the IFCS Ad Hoc Working Group on POPs acknowledges that the provisions of Chapter 19 of Agenda 21 "should also be taken into account." *Final Report*, *supra* note 32, at 6.

46. AGENDA 21, *supra* note 44, paras. 19.29, 19.75-19.76, at 189, 196; *see* Response Strategies, *supra* note 44, at 5. The IFCS consists of senior government officials and involves active participation of NGOs. Response Strategies, *supra* note 44, at 5. The Inter-Organization Programme for the Sound Management of Chemicals ("IOMC") consists of international organizations including UNEP, the World Health Organization ("WHO"), the International Labor Organization ("ILO"), the Organisation for Economic Co-operation and Development ("OECD"), the United Nations Industrial Development Organization, and the Food and Agriculture Organization of the United Nations ("FAO") and plays a coordinating role for the work of these organizations involving Agenda 21, in particular as it relates to chemical safety issues. *Id.* "Neither the IFCS nor the IOMC has the authority to convene negotiations on a legally-binding convention, although they can offer recommendations about the form and content of a convention and coordinate the development of technical input into it." *Id.* at 6.

47. AGENDA 21, *supra* note 44, para. 17.26, at 151.

48. Decision 18/32, Persistent Organic Pollutants, U.N. Environment Programme Governing Council, 18th Sess., 9th mtg. at 1-2 (May 25, 1995), (visited Aug. 16, 1997) *available in* <http://irptc.unep.ch/pops/indxhtms/gc1832en.html> [hereinafter "Decision 18/32"]; *see Final Report*, *supra* note 32, at 1; GREENPEACE, POPS BACKGROUNDER 1 (1996) [hereinafter "POPS BACKGROUNDER"]; Response Strategies, *supra* note 44, at 4.

49. Decision 18/32, *supra* note 48, at 1; *see Final Report*, *supra* note 32, at 3, 5, 8.

emissions, discharges and losses of persistent organic pollutants."[50] They were expected to review existing information on the health and environmental impacts; analyze sources, the ways POPs spread through the environment, and global dissemination; evaluate availability of alternatives and substitutes; and develop realistic proposals for international action.[51] UNEP's Governing Council also instructed the groups to recommend actions to be taken by the UNEP Governing Council and the World Health Assembly to develop an international legal mechanism to control POPs.[52]

UNEP intended for the above described process to address twelve POPs initially, those comprising the "short list" of POPs established by the U.N. Economic Commission for Europe ("ECE") Convention on Long-Range Transboundary Air Pollution ("LRTAP").[53] The short list of twelve POPs (known as the "dirty dozen") identified for initial action includes the following: aldrin, dieldrin, DDT, endrin, chlordane, heptachlor, hexachlorobenzene, mirex, toxaphene, dioxins, furans, and PCBs.[54]

C. IFCS Meetings, 1995-1996

The IFCS Ad Hoc Working Group met on March 9, 1996, in Canberra, Australia and on June 21-22, 1996, in Manila, Philippines.[55] The IFCS Experts met in Vancouver, British Columbia in June 1995 and in Manila, Philippines on June 17-19, 1996.[56] The Manila meetings regarding POPs involved more than 100 government delegates, non-

50. Decision 18/32, *supra* note 48, at 2; *see* Response Strategies, *supra* note 44, at 4.

51. Decision 18/32, *supra* note 48, at 1-2; *see* Response Strategies, *supra* note 44, at 4.

52. Decision 18/32, *supra* note 48, at 2; *see Final Report*, *supra* note 32, at 2; Response Strategies, *supra* note 44, at 4. Decision 18/32 points to a "possible decision [by the UNEP Governing Council] regarding an appropriate international legal mechanism" to phase out POPs. Response Strategies, *supra* note 44, at 4.

53. *Final Report*, *supra* note 32, at 5-6. See *infra* text accompanying notes 80-83 for discussion of LRTAP.

54. Decision 18/32, *supra* note 48, at 1 n.60; POPS BACKGROUNDER, *supra* note 48, at 1.

55. *Final Report*, *supra* note 32, at 3, 5; POPS BACKGROUNDER, *supra* note 48, at 1.

56. *Final Report*, *supra* note 32, at 4-5; VANCOUVER MEETING STATEMENT, *supra* note 1, at 1, 12.

governmental organizations ("NGOs"),[57] industry representatives, and intergovernmental organizations such as the Food and Agriculture Organization of the United Nations ("FAO"), the World Health Organization ("WHO"), and the United Nations Development Programme. At the conclusion of the IFCS Ad Hoc Working Group meeting, a Final Report was adopted and forwarded to UNEP for action at its Governing Council meeting in January-February 1997.[58]

The Final Report recommended that the following actions be taken:[59]

(1) expedite development of a global legally binding instrument;

(2) promptly establish an expert group comprised of both NGOs and intergovernmental organizations to develop science-based criteria and a procedure for identifying additional POPs as candidates for international action;

(3) invite non-ECE members to participate in the ECE LRTAP development of a protocol on POPs;

(4) establish an Intergovernmental Negotiating Committee ("INC") at the UNEP Governing Council; this INC should then establish an "Expert Group" to develop a process for defining criteria to add to the short list of POPs. The Expert Group should have expertise in scientific and socioeconomic analysis, with attention to ecosystems, biodiversity, and special needs of developing countries;

(5) develop appropriate international and regional groups to help developing countries meet a range of needs, including training, information exchange, and institutional infrastructure development;

(6) take measures to rapidly phase out production and subsequent use of the "short list" of POPs as alternatives are made available for the small number of remaining recognized uses; and

57. Attending NGOs included, among others, the World Wide Fund for Nature International (formerly World Wildlife Fund), Greenpeace, Pesticide Action Network Asia and the Pacific, Pesticide Action Network Philippines, and Pesticide Action Network North America. Interview with Marcia Ishii-Eiteman, Pesticide Action Network North America, in San Francisco, Cal. (Nov. 4, 1996).

58. *See Final Report, supra* note 32, at 1, 2, 5.

59. *Id.* at 5-15.

(7) develop a means of selecting replacements for POP pesticides covering non-chemical as well as chemical alternatives and, wherever applicable, reduce reliance on chemical pesticides.

The Final Report recommended that an alternative to a POP pesticide should be considered inappropriate if, due to national or regional conditions, it is likely to cause significant injury to workers, local communities, or the environment.[60]

D. International Activities, 1997

The IFCS presented its recommendations to UNEP's Governing Council at its nineteenth session meeting in Nairobi, Kenya, which took place from January 27 to February 7, 1997. The Governing Council adopted all of the IFCS recommendations presented in the Final Report.[61]

In February 1997, the IFCS met in Ottawa, Canada to determine an appropriate process to follow to develop the agreed upon international convention regarding POPs.[62] At this session, the IFCS also discussed the role NGOs should play in the process and whether any immediate action should be taken to address the threat of POPs.[63]

The next key step in developing an international POPs agreement will be for UNEP to establish an Intergovernmental Negotiating Committee (INC) which will be given the task of drafting the agreement.[64] Because the INC will draft the agreement, membership in the INC is a highly desirable position for the many interested parties, including government representatives, NGOs, and industry representatives. UNEP has

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60. *Id.* at 10. See *infra* text accompanying notes 177-83 for discussion of the debate surrounding chemical versus non-chemical alternatives; see also *infra* text accompanying notes 127-45 for discussion of the development of criteria for substances to be scheduled for a ban or phaseout under the proposed POPs convention.

61. Telephone Interview with Marcia Ishii-Eiteman, Pesticide Action Network North America (Feb. 18, 1997); *see* Memorandum from Jack Weinberg, Greenpeace, to Marcia Ishii-Eiteman, Pesticide Action Network North America 1 (Feb. 10, 1997) (on file with author).

62. Memorandum from Jack Weinberg to Marcia Ishii-Eiteman, *supra* note 61, at 1; Telephone Interview with Marcia Ishii-Eiteman, *supra* note 61.

63. Memorandum from Jack Weinberg to Marcia Ishii-Eiteman, *supra* note 61, at 2; Telephone Interview with Marcia Ishii-Eiteman, *supra* note 61.

64. *See Sound Management of Chemicals: International Efforts Gain Momentum,* UNEP NEWSL. (United Nations Environment Programme), Feb.-Mar. 1997, at 1 [hereinafter "*Sound Management*"].

determined that the INC will consist of both governmental and non-governmental representatives. However, UNEP has labeled chemical industry interests and NGOs within the same so-called "non-governmental" classification. Therefore, while there may be a balance of governmental and non-governmental representation, there will not necessarily be a balance of environmental and chemical industry interests.[65]

At the UNEP meeting in Nairobi in early 1997, the Governing Council agreed that formal negotiation of the global POPs protocol would begin in early 1998 with ratification scheduled for 2000.[66] The participants also agreed that "immediate action" should be taken based on the Manila Final Report recommendations without waiting for the ultimately negotiated instrument.[67]

E. Other Complementary Global Efforts to Limit POPs

In addition to the activity of UNEP and the IFCS, other ongoing global efforts are currently attempting to reduce the risks associated with POPs. One such program is the Global Programme of Action on the Protection of the Marine Environment from Land-Based Activities ("GPA").[68] Adopted in 1995, the GPA advises that a comprehensive series of measures should be adopted to reduce POPs-related emissions at regional, national, and global levels around the world in order to protect the marine environment and human health and to realize sustainable development.[69] The GPA, like the IFCS, recognizes the need for a global legally binding instrument on POPs.[70]

Another current global response to chemical safety problems is the UNEP/FAO Prior Informed Consent ("PIC") procedure. The PIC procedure, which was introduced in 1989, establishes protocols for trade in certain banned or restricted chemicals and pesticides.[71] Under the PIC

65. Interview with Marcia Ishii-Eiteman, *supra* note 57.

66. Memorandum from Jack Weinberg to Marcia Ishii-Eiteman, *supra* note 61, at 2.

67. *Id.*

68. *Global Programme of Action*, *supra* note 1, at 1, 9, 37-40. The GPA was adopted in Washington, D.C., on Nov. 3, 1995. *Id.* at 1.

69. *Id.* at 1, 7, 9, 37-41.

70. *Final Report*, *supra* note 32, at 2-3; Response Strategies, *supra* note 44, at 4.

71. *See* AGENDA 21, *supra* note 44, paras. 19.35-19.36, at 190; UNEP News Release 1996/51, *New Environmental Controls Sought for Toxic Chemicals and Pesticides* (Sept. 12, 1996). The PIC procedure involves many POP substances but is not specifically

procedure, countries exporting pesticides which have been banned or restricted in the country of origin must give notice of the hazardous nature of the chemicals to the importing country. The importer can then decide whether to approve or disapprove importation.[72] The PIC procedure is voluntary, and notification is required under PIC only when the chemical is imported for the first time.[73] However, efforts are currently being made to develop PIC into a legally binding instrument.[74] Several POPs are on the list of PIC chemicals.[75]

Rather than being incorporated together, the PIC procedure and the upcoming POPs agreement will most likely remain as separate pieces in the overall picture of global policy regarding chemicals.[76] Negotiations of the PIC regime will likely conclude in 1997, whereas the formal ne-

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limited to POPs. *Final Report*, *supra* note 32, at 4; Response Strategies, *supra* note 44, at 6; *see also* Memorandum from Ronald Macfarlane, Pesticide Action Network Asia and the Pacific, to David Hathaway, Pesticide Action Network North America 2 (Oct. 4, 1996) (on file with author).

72. UNEP News Release 1996/51, *supra* note 71.

73. Memorandum from Ronald Macfarlane to David Hathaway, *supra* note 71, at 3. The issue of export notification has been hotly debated; the importing developing countries favor notification upon each shipment, while exporting countries such as the United States believe this practice would be unnecessary and useless. *Id.*

74. Elizabeth Dowdeswell, Executive Director, UNEP, Statement at the Second Session of the Intergovernmental Negotiating Committee for an International Legally Binding Instrument for the Application of the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Sept. 16, 1996), UNEP Speech 1996/22 (transcript available from author); *see generally* Consumers International et al., Action to Support an Improved Prior Informed Consent as an Early-Warning System for Trade in Hazardous Chemicals (1997) (an NGO submission to the Third International Negotiating Committee of the International Legally Binding Instrument for the application of the PIC procedure, Geneva, Switzerland, May 26-30, 1997) (on file with author); *see also* Memorandum from Ronald Macfarlane to David Hathaway, *supra* note 71, at 3.

75. *Final Report*, *supra* note 32, at 4; Response Strategies, *supra* note 44, at 6; *see also* Memorandum from Ronald Macfarlane to David Hathaway, *supra* note 71, at 2 (discussing the inclusion of POPs in the PIC process).

76. Interview with Marcia Ishii-Eiteman, Pesticide Action Network North America, in San Francisco, Cal. (July 29, 1997). Aside from the POPs convention, a broader goal of the IFCS and environmental NGOs such as PAN is the negotiation of a general international framework convention on chemicals. *Id.*; *see Sound Management*, *supra* note 64, at 1; Memorandum from Ronald Macfarlane to Pesticide Action Network North America, *supra* note 32, at 2-4 (discussing an agenda involving an "integrated mechanism" regarding chemicals). The PIC regime and the POPs agreement are parts of this overall plan. Interview with Marcia Ishii-Eiteman, *supra*.

gotiation of the POPs instrument is not scheduled to begin until 1998.[77] Therefore, environmental NGOs such as the Pesticide Action Network view the PIC procedure as a separate process that would possibly be slowed down if it were included in the POPs negotiations.[73] In any case, the information exchange fostered by the PIC procedure ultimately may assist in the eventual control of POPs and their elimination from the global environment.[79]

In addition to the GPA and the PIC procedure, the issue of POPs was addressed in the LRTAP convention regarding air pollution.[80] Administered by the ECE, this 1979 convention was the first legally binding global instrument addressing air pollution issues.[81] In 1994, LRTAP initiated discussion of a regional protocol for POPs.[82] As stated previously, LRTAP identified a short list of twelve POPs (the "dirty dozen"), which was adopted by the IFCS for initial action, and LRTAP is currently developing criteria for additions to this list.[83] LRTAP's process is directly relevant to the efforts of the IFCS, but its work is not duplicative of the IFCS because LRTAP does not include non-ECE members other than the United States, Canada, and Japan.

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77. Memorandum from Ronald Macfarlane to Pesticide Action Network North America, *supra* note 32, at 2; Memorandum from Jack Weinberg to Marcia Ishii-Eiteman, *supra* note 61, at 2.

78. Interview with Marcia Ishii-Eiteman, *supra* note 76.

79. For instance, in negotiating the POPs treaty, the PIC process may be used as a reference to the toxicity of certain POPs and thus may act as part of the criteria for substances to be listed in the POPs treaty. *Id.*

80. The LRTAP Convention was signed by 33 governments and the ECE in 1979. United Nations: Convention on Long-Range Transboundary Air Pollution Concerning the Control of Emissions of Volatile Organic Compounds or Their Transboundary Fluxes, Nov. 13, 1979, 18 I.L.M. 1442 (1979) (entered into force Mar. 16, 1983).

81. *See* Introductory Note to United Nations: Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution Concerning the Control of Emissions of Volatile Organic Compounds or Their Transboundary Fluxes, Nov. 18, 1991, 31 I.L.M. 568, 568 (1991); JON MARTIN TROLLDALEN, INTERNATIONAL ENVIRONMENTAL CONFLICT RESOLUTION: THE ROLE OF THE UNITED NATIONS 149-50 (1992).

82. POPS BACKGROUNDER, *supra* note 48, at 1.

83. *Id.* See *supra* text accompanying note 54 for the short list of twelve POPs identified for initial action. For a description of LRTAP's recent activities, see generally *Executive Body for the Convention on Long-Range Transboundary Air Pollution, Ad Hoc Preparatory Working Group on Persistent Organic Pollutants, Report on the Third Session*, U.N. Economic and Social Council, Economic Commission for Europe, U.N. Doc. EB.AIR/WG.7/6 (1996).

Other regional efforts to reduce the effects of POPs include the following: (1) Convention for the Protection of the Marine Environment of the North East Atlantic;[84] (2) Barcelona Convention for the Protection of the Mediterranean Sea against Pollution;[85] (3) Esbjerg Declaration on the Protection of the North Sea;[86] (4) North American Commission for Envi-

84. Convention for the Protection of the Marine Environment of the North-East Atlantic, Sept. 22, 1992, 32 I.L.M. 1069 (1993) [hereinafter "OSPAR Convention"]; *see* Response Strategies, *supra* note 44, at 6. Annex I to this convention, regarding protection from land-based pollution, states that "it shall . . . be the duty of the Commission to draw up . . . plans for the reduction and phasing out of substances that are toxic, persistent and liable to bioaccumulate arising from land-based sources." OSPAR Convention, *supra*, Annex I, art. 3(a), 32 I.L.M. at 1090. Signatories to the OSPAR Convention are Belgium, Denmark, the European Communities, Finland, France, Germany, Iceland, Ireland, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom. *Id.*, 32 I.L.M. at 1069.

85. Convention for the Protection of the Mediterranean Sea Against Pollution, *opened for signature* Feb. 16, 1976, 1977 O.J. (L 240) 3, 15 I.L.M. 285 (1977) (entered into force Feb. 12, 1978) [hereinafter "Barcelona Convention"]; *see Final Report*, *supra* note 32, at 1; Response Strategies, *supra* note 44, at 6. This convention, ratified by 15 Mediterranean coastal states, provides for the adoption of additional protocols. Barcelona Convention, *supra*, arts. 15, 16, 1977 O.J. (L 240) 6, 15 I.L.M. at 294. The Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-Based Sources was adopted on May 17, 1980, and entered into force on June 17, 1983. Protocol for the Protection of the Mediterranean Sea Against Pollution from Land-Based Sources, 1983 O.J. (L 67) 3. It includes the following provisions relating to POPs: "The Parties undertake to eliminate pollution of the Protocol area from land-based sources by substances listed in Annex I to this Protocol." *Id.* art. 5(1), 1983 O.J. (L 67) 4. "The Parties shall strictly limit pollution from land-based sources in the Protocol area by substances or sources listed in Annex II to this Protocol." *Id.* art. 6(1), 1983 O.J. (L 67) 4. Annex I includes substances selected not only on the basis of their toxicity, but based on their persistence and bioaccumulation. *Id.* Annex I(A), 1983 O.J. (L 67) 7. These substances include organohalogen compounds, organophosphorus compounds, organotin compounds, "persistent synthetic materials . . . which may interfere with any legitimate use of the sea," and "substances having proven carcinogenic, teratogenic or mutagenic properties in or through the marine environment." *Id.* Annex I(A)(1), (2), (3), (7), (8), 1983 O.J. (L 67) 7. Annex II includes "biocides and their derivatives not covered in Annex I." *Id.* Annex II(A)(2), 1983 O.J. (L 67) 8. Factors to be considered in authorizing the discharge of wastes covered under the convention include the substances' persistence (physical, chemical, or biological) in the marine environment; accumulation in biological materials or sediments; and effects on human health through pollution impact on edible marine organisms and bathing waters. *Id.* Annex III(B)(1), (3), Annex III(E)(1)(a), (b), 1983 O.J. (L 67) 9-10.

86. *See* Response Strategies, *supra* note 44, at 6.

ronmental Cooperation;[87] and (5) Arctic Environmental Protection Strategy (AEPS).[88]

The IFCS's Final Report acknowledges the need for "coordination among different regional and international initiatives on POPs" to ensure that programs developed to curb POPs do not conflict with one another or lead to duplication of efforts.[89]

IV. Outstanding Issues

Although the international community appears to agree that an international instrument is needed to phase out the production and use of POPs, many practical issues must be resolved in order to formulate the agreement. While environmental groups urge that immediate action be taken on the wide range of POPs, business and chemical interests are

87. This commission is currently focusing on chemicals including DDT and chlordane, both of which are POP pesticides. *See* Task Force on DDT and Chlordane, North American Regional Action Plan on Chlordane (Oct. 10, 1996) (unpublished manuscript, on file with author); Task Force on DDT and Chlordane, North American Regional Action Plan on DDT (Oct. 10, 1996) (unpublished manuscript, on file with author). Additionally, a July 1996 report issued by the United States-Canada International Joint Commission ("IJC") focusing on contamination of the Great Lakes region urges both governments to target POPs for 'virtual elimination from production and commerce,' calling for a "Binational Persistent Toxics Virtual Elimination Strategy." *Environmentalists Hail New Reports Calling for Dioxin Phaseout*, 24 PESTICIDE & TOXIC CHEMICAL NEWS, No. 37, July 10, 1996, *available in* 1996 WL 8852535. The IJC report, entitled "Eighth Biennial Report on Great Lakes Water Quality," contains ten recommendations, including the following: (1) zero discharge of persistent toxic chemicals; (2) development of a bilateral process to adopt control programs to eliminate POPs by certain deadlines; (3) recognizing that the food chain is one of the primary sources of exposure to POPs, the use of common health standards in issuing sports fishing advisories throughout the region; (4) use of the following principles to control pollution: "precaution; prevention; [and] targeting groups of chemicals rather than single ones using a weight of evidence approach . . . . " *Id.*

88. Arctic Environmental Protection Strategy, June 14, 1991, 30 I.L.M. 1624 (1991) [hereinafter "AEPS"]; *see* Response Strategies, *supra* note 44, at 6. The AEPS is "a strategy to coordinate national activities and policies among [Canada, Denmark, Finland, Iceland, Norway, Russian Federation, Sweden, and the United States] to strengthen environmental protection efforts in the Arctic." Joint Communique and Declaration on the Establishment of the Arctic Council, Sept. 19, 1996, 35 I.L.M. 1382, 1383 (1996). The AEPS includes language relating to identifying and reducing the risks associated with POPs ("persistent organic contaminants") and the need for multilateral action. AEPS, *supra*, arts. 3.1, 4.1, 5.1, 30 I.L.M. at 1644, 1650-51.

89. *Final Report*, *supra* note 32, at 14.

likely to argue for a more deliberate approach that will allow them additional time to develop alternatives to POPs before they are banned.[90] Such opposing interests may propose different timeframes for banning the use, production, and distribution of POPs, as well as different measures to deal with existing stockpiles of POPs. Controversial issues which must be addressed include: (1) allocating responsibility among developed and developing countries; (2) establishing scientific criteria for adding new chemicals to be covered by the POPs agreement; (3) establishing procedures to phase out byproducts such as dioxins and furans; (4) reconciling provisions of the POPs convention with regional and national agreements and regulations; (5) combatting the growth of a "black market" in banned chemicals; (6) alternatives to POPs (substitute chemicals versus non-chemical practices and technologies); and (7) information exchange and standards for protection from the hazards of POPs.

A. Allocating Shared Responsibility Among Developed and Developing Countries

Participants at the IFCS meeting in Manila failed to reach a consensus regarding the definition of the concept of "shared responsibilities" among nations, industry, and international organizations.[91] NGOs such as Greenpeace maintain the position that less developed countries ("LDCs") alone should not bear the primary social and economic burdens of phasing out POPs.[92] This position is in line with certain basic

90. *See infra* text accompanying notes 177-83 (discussing the debate between chemical substitutes and non-chemical alternatives).

91. *Final Report*, *supra* note 32, at 8; Ishii-Eiteman, *supra* note 4, at 4.

92. POPS BACKGROUNDER, *supra* note 48, at 6. Greenpeace states that "[b]alance and equity requires [sic] the [POPs] instrument give equivalent attention to POPs-generating technologies for which economic consequences currently fall mainly in highly industrialized countries . . . ." *Id.* Greenpeace also stresses that attention must be paid to the POPs-generating technologies in developed nations because

> [t]hese technologies represent major global POPs sources which now are being aggressively exported from the north to the south. It would be tragic to permit continued pressure on southern countries to increase dependence on a new generation of POPs-polluting technologies at the same time they are being pressed to end their dependence on an earlier generation of POPs-polluting technologies.

Id.

principles initially codified in the 1972 Stockholm Declaration, which held that the technical and financial needs of LDCs should be considered in making resources available to preserve and improve the environment.[93]

It is well documented that certain powerful chemical conglomerates regularly export substances which have been banned from use in many industrialized countries to LDCs where regulations are much more lax.[94] This practice has led to pesticide abuse in LDCs, causing severe contamination of the environment and food chain, as well as human suffering and death from poisoning.[95] Ironically, some LDCs are moving in the dangerous direction of significantly *increasing* their demand for hazardous POP substances. In countries such as Vietnam, for instance, which is eager to boost agricultural exports because of increased international demand, farmers embrace heavy pesticide use as the means to realize short-term profits.[96] On the other hand, the agrochemical industry's powerful influence over international trade policy has come under increasing criticism, particularly among Pacific Rim nations.[97] In light

93. Declaration of the United Nations Conference on the Human Environment, June 16, 1972, Principle 12, 11 I.L.M. 1416, 1419 (1972) [hereinafter "Stockholm Declaration"]. The Stockholm Declaration represented an initial effort at multilateral cooperation to address protection of the environment. *See, e.g.*, Michael J. Kelly, *Overcoming Obstacles to the Effective Implementation of International Environmental Agreements*, 9 GEO. INT'L ENVTL. L. REV. 447, 450-51 (1997).

94. *See, e.g.*, *Better Alternatives*, *supra* note 6, at 5; PESTICIDE PROBLEMS, *supra* note 27, at 7-9; THE PESTICIDE TRAIL, *supra* note 29, at 24; Smith, *supra* note 31, at 3, 17 (noting the exports of banned pesticides from industrialized countries); *see generally* ROBERT VAN DEN BOSCH, THE PESTICIDE CONSPIRACY (1978); CIRCLE OF POISON, *supra* note 27. *See also Trade Restrictions on Poisonous Chemicals Eyed*, JAPAN WKLY. MONITOR, June 17, 1996, *available in* 1996 WL 5811715 (noting that several pesticides banned in industrial countries are still used in large amounts in developing countries due to lax controls).

95. PESTICIDE PROBLEMS, *supra* note 27, at 50.

96. *Vietnam Agriculture: Farmers Forget Environment*, INTER PRESS SERVICE, Feb. 19, 1996, *available in* 1996 WL 7881698. For a discussion of the problems associated with, and suggested approaches to handle, the recent dramatic agroexport expansion in LDCs, see generally BITTERSWEET HARVESTS, *supra* note 27. *See also supra* notes 27-33 and accompanying text.

97. *See NGOs Attempt to Demystify APEC*, NEW STRAITS TIMES, Nov. 20, 1996, *available in* 1996 WL 12294763. A representative of Pesticide Action Network Asia and the Pacific is quoted as stating that five multinational corporations control 77% of the world's food trade. *Id. See also* Paarlberg, *supra* note 8, at 311 (noting the lack of accountability of international pesticide manufacturers for the harmful practice of aggres-

of this situation, the following issues must be dealt with in the negotiation of the POPs instrument(s).

1. Research & Development Assistance

Developing countries typically lack the internal resources to independently eliminate sources of POPs and to manage and destroy stock supplies and reservoirs.[98] The FAO estimated in a June 1996 report that more than 100,000 tons of pesticides are being stored in LDCs and urged immediate action on the part of industrialized countries to assist with the disposal of this lethal waste which poses grave threats to the environment and human health.[99] LDCs continue to rely on DDT and other pesticides to control insect-borne diseases and to increase their agricultural yields.[100] In view of this heavy reliance, LDCs will need both financial and technological assistance in order to reduce and phase out such use.[101] The IFCS Final Report acknowledges that the special needs of LDCs will have to be addressed in any legally binding instrument to phase out the use of POPs.[102] Nevertheless, the specific terms by which the parties to the POPs agreement will address this problem remain unresolved.

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sively selling substances in developing countries that are banned in industrialized nations).

98. *See* AGENDA 21, *supra* note 44, para. 19.55, at 193-94; *Better Alternatives*, *supra* note 6, at 14-18 (summarizing efforts to dispose of obsolete stocks of POPs in LDCs); *Final Report*, *supra* note 32, at 12-13; PESTICIDE PROBLEMS, *supra* note 27, at 7-15.

99. *Pesticides Threaten Health in the Third World, UN Says*, OTTAWA CITIZEN, June 6, 1996, at A6, *available in* 1996 WL 3605880.

100. *See Better Alternatives*, *supra* note 6, at 19-24 (discussing the high demand for DDT to control mosquito-borne diseases and possible alternatives); PESTICIDE PROBLEMS, *supra* note 27, at 49 (chronicling the use of DDT in Indonesia to control malaria); Paarlberg, *supra* note 8, at 309 (stating that use of pesticides in LDCs is often "a matter of life or death"); PAN/CI Position Paper, *supra* note 32 (indicating the perceived importance of DDT for disease control in LDCs); *see also supra* text accompanying note 96 (discussing heavy use of pesticides by farmers in LDCs); *see generally* BITTERSWEET HARVESTS, *supra* note 27.

101. Many multilateral environmental agreements acknowledge the limited capabilities of LDCs. *See, e.g.*, AGENDA 21, *supra* note 44, para. 19.23, at 189; United Nations Environment Programme Conference of Plenipotentiaries on the Global Convention on the Control of Transboundary Movements of Hazardous Wastes: Final Act and Text of Basel Convention, *opened for signature* Mar. 22, 1989, Preamble, art. 10(3), art. 11(1), 28 I.L.M. 649, 657-59, 668 (1989) [hereinafter "Basel Convention"]. See *infra* notes 194-95 and accompanying text for discussion of the Montreal Protocol's (*infra* note 127) provisions regarding LDCs.

102. *Final Report*, *supra* note 32, at 6-8, 14.

2. *Polluter Pays Principle*[103]

The purpose of the "polluter pays principle" is to integrate the social and environmental costs of a polluting substance into its production processes.[104] Advocates of this principle believe it should be a fundamental element of the POPs instrument. These advocates assert that corporations that have benefited financially from production and distribution of POPs should assist the transition away from the use of POPs toward non-chemical alternatives and that these transnational corporations should finance the safe disposal of obsolete POPs.[105]

A POPs agreement advocating the "polluter pays principle" would most likely be modeled on the funding structure of the Montreal Protocol.[106] It should be noted that although under the Montreal Protocol an explicit "polluter-pays" basis for contribution was advocated by several

103. The "polluter pays principle" ("PPP") has been incorporated into numerous international environmental agreements. Often the PPP is interpreted as imposing the "costs of pollution prevention, control and reduction measures" on the polluter. Belgium-France-Netherlands: Agreements on the Protection of the Rivers Meuse and Scheldt, *opened for signature* Apr. 26, 1994, art. 3, para. 2(d), 34 I.L.M. 851, 855 (1995); United Nations: Convention on the Protection and Use of Transboundary Watercourses and International Lakes, Mar. 17, 1992, part I, art. 2, para. 5(b), 31 I.L.M. 1312, 1315 (1992). However, more than one understanding of the PPP exists. For instance, one European environmental treaty specifically focuses on strict liability and direct compensation to victims of environmental damage. Council of Europe: Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment, June 21, 1993, ch. I, art. 1, 32 I.L.M. 1228, 1230 (1993). Other agreements, however, follow the approach delineated in the recommendation made by the OECD in 1989, which specifically rejects the concept of economic compensation to victims as part of the PPP and, instead, includes costs of prevention measures. *Organisation for Economic Cooperation and Development: Council Recommendation on the Application of the Polluter-Pays Principle to Accidental Pollution*, Appendix, paras. 3, 8, OECD Doc. (July 7, 1989), 28 I.L.M. 1320, 1322-23 (1989); *see, e.g.*, agreements cited *supra*. Thus, one approach is retrospective and punitive while the other is prospective and preventative.

104. WWF POSITION PAPER, *supra* note 14, at 14. Some commentators see the PPP as an efficient way for trading partners to address global environmental pollution that is rooted in basic economic theory. *See, e.g.*, Thomas J. Schoenbaum, *International Trade and Protection of the Environment: The Continuing Search for Reconciliation*, 91 AM. J. INT'L L. 268, 295-98 (1997) (asserting that the PPP is an important vehicle in efforts to reconcile trade issues with environmental concerns).

105. WWF POSITION PAPER, *supra* note 14, at 14.

106. *See id.* at 16.

LDCs, ultimately this provision was rejected.[107] Instead, the parties to the Montreal Protocol established a Multilateral Fund made up of contributions from developed countries and industry; under the terms of that agreement, LDCs were to receive disbursements from the fund to develop and purchase ozone-safe equipment and products.[108]

The parties to the Rio Declaration on Environment and Development ("Rio Declaration") adopted the "polluter pays principle" with the qualification that its application should not "distort" international trade and investment.[109] Agenda 21, the UNCED program of action on the environment produced at the 1992 Rio Earth Summit, promotes the "polluter pays principle" as an economic incentive to clean up the environment.[110] Agenda 21 also advocates chemical industry responsibility for life cycle analysis of hazardous chemicals, as well as the environmentally safe disposal of such chemicals.[111]

While Agenda 21 promotes a policy of producer liability, scholars have noted that the imposition of strict liability on chemical producers will not deter every instance of global environmental damage.[112] As in

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107. *See* Jason M. Patlis, Note, *The Multilateral Fund of the Montreal Protocol: A Prototype for Financial Mechanisms in Protecting the Global Environment*, 25 CORNELL INT'L L.J. 181, 209 & nn. 187-88 (1992).

108. Montreal Protocol Parties: Adjustments and Amendments to the Montreal Protocol on Substances That Deplete the Ozone Layer, June 29, 1990, art. 10, paras. 2-10, 30 I.L.M. 537, 550-51 (1991) [hereinafter "London Revisions"]; *see* Patlis, *supra* note 107, at 182. For discussion of the specific provisions of the Montreal Protocol regarding funding, see generally FRANK BIERMANN, SAVING THE ATMOSPHERE: INTERNATIONAL LAW, DEVELOPING COUNTRIES AND AIR POLLUTION 102-06 (1995); Patlis, *supra* note 107. See *infra* text accompanying notes 192-202 for discussion of the Montreal Protocol as a model for a POPs convention.

109. United Nations Conference on Environment and Development: Rio Declaration on Environment and Development, *adopted* June 14, 1992, Principle 16, 31 I.L.M. 874, 879 (1992) [hereinafter "Rio Declaration"]. Principle 16 states: "National authorities should endeavour to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment." *Id.*

110. AGENDA 21, *supra* note 44, paras. 17.22(d), 19.49(a)-(b), at 150, 192.

111. *Id.* paras. 19.48, 19.49(a), 19.50(a)-(c), at 192-93.

112. *Id.* para. 19.49(a)-(b), at 192; Sanford E. Gaines, *International Principles for Transnational Environmental Liability: Can Developments in Municipal Law Help Break the Impasse?*, 30 HARV. INT'L L.J. 311, 313-16 (1989); Patlis, *supra* note 107, at 211-12.

the case of ozone depletion, although estimates of the future costs of banning POPs may be predicted, the health and environmental costs are impossible to measure.[113] Additionally, as is the case with ozone depletion, it is impossible to attribute environmental harms to one single source due to the complex nature of POPs' harmful effects.[114] Therefore, strict liability cannot realistically be imposed as a means to fund the phaseout of POPs.

In short, it appears that LDCs will require a certain measure of "assistance funding" from developed countries and chemical producers in order to be able to make their transition away from dependence on POPs.[115] The extent to which chemical companies and developed nations will fund these efforts remains to be seen.

3. *Reporting Requirements and Exchange of Information*

The proposed POPs agreement will likely include provisions dealing with the exchange of information and reporting requirements regarding the production and use of POPs. The IFCS Final Report recommends "comprehensive reporting and information exchange, within and between countries and intergovernmental organizations" regarding scientific data, sources and risks of POPs, and alternatives.[116] One scientific expert on endocrine disrupters suggests that any proposed international instrument should include provisions to improve health data systems in order to allow regional and international exchange of information.[117] In contrast to the current PIC provisions which are voluntary, the information exchange provisions of the POPs convention should be mandatory among the parties in order to effectively regulate the distribution of POPs.[118]

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113. COLBORN, *supra* note 2, at 18; Patlis, *supra* note 107, at 212 & n.205.

114. COLBORN, *supra* note 2, at 18; Patlis, *supra* note 107, at 210 & n.195 (citing Ved P. Nanda, *Global Warming and International Environmental Law—A Preliminary Inquiry*, 30 HARV. INT'L. L.J. 375, 383-84 (1989)).

115. *See Final Report*, *supra* note 32, at 7-8; Patlis, *supra* note 107, at 181, 211-12.

116. *Final Report*, *supra* note 32, at 6-7.

117. COLBORN, *supra* note 2, at 222.

118. See *supra* text accompanying notes 71-79 for discussion of the PIC regime.

4. Precautionary Principle

The timing and standards for phasing out POPs covered under the proposed convention are likely to be the subjects of intense and prolonged negotiation. Such negotiations may be framed by the underlying "precautionary principle," which holds that where threats exist "of serious or irreversible environmental damage, lack of scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation."[119] The "precautionary principle" has been applied under international conventions regarding the environment as necessary to prevent irreparable environmental damage.[120] The Rio Declaration, produced at the 1992 Rio Earth Summit, advocates a "precautionary approach" similar to this principle.[121] The precautionary approach holds that pollution should be prevented before it occurs, rather than managed after it has occurred.[122] An example of this concept can be seen in the United Nations Convention on the Law of the Sea, which imposes strict measures for the prevention and reduction of pollution, including that which is caused by POPs.[123] Certain NGOs advocate such a preventative approach for the proposed POPs agreement.[124] In any event, the IFCS Experts group has determined that enough scientific evidence exists "on the adverse human health and environmental impacts of POPs to warrant coherent action at the national, regional and international level."[125] The precautionary principle also underlies the debate regarding

119. WWF POSITION PAPER, *supra* note 14, at 13. See generally THE PRECAUTIONARY PRINCIPLE AND INTERNATIONAL LAW: THE CHALLENGE OF IMPLEMENTATION 1-14, 27-28, 31-32 (David Freestone & Ellen Hey eds., 1996) for a comprehensive analysis of the precautionary principle and the history of its application.

120. *See, e.g.*, United Nations Conference on Environment and Development: Framework Convention on Climate Change, May 9, 1982, art. 3, para. 3, 31 I.L.M. 849, 854 (1992); Second International Conference on the Protection of the North Sea: Ministerial Declaration Calling for Reduction of Pollution, Nov. 25, 1987, art. XVI, para. 1, 27 I.L.M. 835, 840 (1988).

121. Rio Declaration, *supra* note 109, Principle 15, 31 I.L.M. at 879.

122. *See* AGENDA 21, *supra* note 44, paras. 17.5(d), 17.21, 19.49, at 148, 150, 192; WWF POSITION PAPER, *supra* note 14, at 14.

123. Third United Nations Conference on the Law of the Sea: Final Act, Dec. 10, 1982, Part XII, arts. 194 -95, 21 I.L.M. 1245, 1308 (1982).

124. WWF POSITION PAPER, *supra* note 14, at 14-15; PAN/CI Position Paper, *supra* note 32.

which criteria should be used for adding POPs to the list of the initial twelve targeted POPs.[126]

B. Criteria for Substances to Be Covered by the POPs Agreement

1. Formal Mechanisms for Adding to the List

The drafters of the POPs agreement will need to create flexible mechanisms to accommodate not only the different types and uses of POPs, but also to allow for future discoveries regarding additional harmful POPs.[127] As noted previously, the current list of twelve POPs (the "dirty dozen") consists of the following, many of which are already banned or being phased out in developed countries: aldrin, dieldrin, DDT, endrin, chlordane, heptachlor, hexachlorobenzene, mirex, toxaphene, dioxins, furans, and PCBs.[128] Other known POPs, such as

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125. VANCOUVER MEETING STATEMENT, *supra* note 1, at 4. The experts agreed that the action called for would include "bans, phase-outs and provisional severe restrictions for certain POPs." *Id.*

126. *See infra* text accompanying notes 132-45 (discussing the debate regarding potential criteria for POPs to be covered by the agreement to ban them).

127. *See* Greenpeace International, Persistent Organic Pollutants: Timing, Scope and Mandate of the International Negotiating Committee 6 (Jan. 1997) (advocating that the proposed POPs instrument be applied not only to the "dirty dozen" but also to other POPs "meriting inclusion in the future") (submitted by Greenpeace International to the 19th Session of the Governing Council of UNEP, Jan. 27-Feb. 7, 1997, Nairobi, Kenya) (on file with author). Prior international environmental agreements have provided such flexibility through the adoption of protocols and amendments addressing issues not covered in the original instrument. *See, e.g.*, Basel Convention, *supra* note 101, arts. 17, 18, 28 I.L.M. at 673-74; Barcelona Convention, *supra* note 85, arts. 15, 16, 15 I.L.M. at 294. *See also* Protocol on Substances That Deplete the Ozone Layer, Sept. 16, 1987, 26 I.L.M. 1541 (1987) [hereinafter "Montreal Protocol"]. The Montreal Protocol was later amended. United Nations: Montreal Protocol on Substances That Deplete the Ozone Layer–Adjustments and Amendment, Nov. 23-24, 1992, 32 I.L.M. 874 (1993) (entered into force Jan. 1, 1994) [hereinafter "Copenhagen Amendments"]; London Revisions, *supra* note 108, 30 I.L.M. 537.

128. Decision 18/32, *supra* note 48, at 1 n.60; POPS BACKGROUNDER, *supra* note 48, at 1; *see supra* text accompanying notes 28-30, 32-33 (indicating U.S. exports of POPs banned for domestic use). Not until May 1997 did the production of chlordane and heptachlor come to a halt in the United States. Up to that time, one U.S. company remained the sole producer of these highly toxic POPs, which were banned from use within the United States in 1987, exporting them to LDCs. *Better Alternatives*, *supra* note 6, at 5; *Velsicol Ceases Production of Chlordane and Heptachlor*, PESTICIDE ACTION NETWORK N. AM. UPDATES SERV., May 23, 1997, at 1; Ishii-Eiteman, *supra* note 4, at 1. DDT is produced in several countries including China and Mexico and continues to be exported

endosulfan, for instance, have yet to make it to the specifically targeted list under the proposed agreement, largely due to the fact that they continue to be used widely in developed countries such as the United States.[129]

As scientific research proceeds and new information regarding POPs is discovered, the need will arise for new safeguards. In fact, the IFCS Final Report recommends that an expert group be established by the INC to develop a procedure for identifying additional POPs.[130]

As the need arises to add new chemicals to the list of banned substances, a mechanism will be needed to add amendments and protocols to the POPs agreement. Use of the amendment process in international agreements is not new. The Montreal Protocol provides for such amendments to the original agreement, requiring that the parties agree by a two-thirds majority vote to any additions or amendments to the list of substances.[131] The same type of requirement could be applied to the POPs instrument. Alternatively, the parties could establish an "expert group" to determine periodically which POPs should be added to the list covered by the convention. This group, consisting of representatives from both developed and less developed countries, could issue an official report periodically (e.g., every five years) reviewing the scientific evidence and recommending any additions or changes to the list of banned POPs.

2. *Laboratory Data versus Actual Use Criteria*

The issue remains as to the manner in which suspect chemicals will be added to the "dirty dozen" list of banned POPs once the POPs agreement is implemented. As stated previously, the IFCS concluded in June 1996 that an expert group should be established to develop science-based criteria and procedures for identifying POPs in addition to the short list

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by the United States to LDCs. Ishii-Eiteman, *supra* note 4, at 1. See *supra* note 32 for a description and background of DDT.

129. *See* POPS SUMMARY, *supra* note 1, at 1; *Pesticides, supra* note 9, at 480. *See also* STEINGRABER, *supra* note 9, at 161-67 (describing domestic regulation of pesticides, or the lack thereof, in the United States). See Kelly, *supra* note 93, at 454-57, for a discussion of the differing perspectives of developed ("Northern") and developing ("Southern") states.

130. *Final Report, supra* note 32, at 6, 15.

131. Montreal Protocol, *supra* note 127, art. 2, paras. 9-10, 26 I.L.M. at 1553-54.

of twelve.[132] However, there was disagreement at the Manila conference between the European representatives and those of LDCs as to the appropriate scientific means for evaluating POPs. Although representatives from many European countries (represented by LRTAP) advocate the use of European laboratories to develop scientific criteria, many of the LDC representatives, and those from regions not represented by LRTAP, argue that "laboratory" data do not reflect exposure levels or methods of chemical usage experienced in their locales, and therefore, laboratory data should not be used as the criteria for a global legally binding instrument.[133] LDCs and others argue that laboratory tests which presume the field use of protective gear would be inaccurate since, as a practical matter, users of agrochemicals in rural locales often fail to use protective gear[134] and often cannot read warning labels, even where such warnings are provided.[135]

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132. *Final Report, supra* note 32, at 6, 15. The Final Report states that "[t]he process should incorporate criteria pertaining to persistence, bioaccumulation, toxicity and exposure in different regions, and should take into account dispersion mechanisms for the atmosphere and the hydrosphere, migratory species and the need to reflect possible influences of marine transport and tropical climates." *Id.* at 6, 15.

133. Interview with Marcia Ishii-Eiteman, *supra* note 57. Another related example of geographically-based differences is suggested by authorities on environmental NGOs. THOMAS PRINCEN & MATTHIAS FINGER, ENVIRONMENTAL NGOS IN WORLD POLITICS: LINKING THE LOCAL AND THE GLOBAL 7-8 (1994). The authors suggest that because environmental NGOs based in the North (i.e., Europe) were rooted in the nuclear disarmament movement, their perspective and approaches are usually scientifically based. *Id.* Many environmental NGOs from the South (developing countries such as the Philippines), on the other hand, originated during periods of political upheaval resulting from human rights challenges, social justice movements, or public health crises. *Id.*

134. *See, e.g.*, PESTICIDE PROBLEMS, *supra* note 27, at 40. Protective clothing and other precautions, although considered essential to the use of pesticides, often are not affordable or available in LDCs. *Better Alternatives, supra* note 6, at 6-7, 10, 13; Paarlberg, *supra* note 8, at 311. A 1996 International Labor Organization (ILO) report indicates that child workers in LDCs regularly mix, load, and apply highly toxic pesticides, fertilizers, and herbicides. *See From Prostitution, Manual Labor to Exposure to Toxic Substances*, BUSINESSWORLD (Manila), Dec. 4, 1996, *available in* 1996 WL 14369860. In the Philippines, agrochemical companies in combination with the government have recently campaigned to educate farmers regarding safe and unsafe uses of pesticides. *CPAP Steps Up Drive Against Pesticide Misuse*, BUSINESSWORLD (Manila), July 8, 1996, *available in* 1996 WL 11683126; *Crop Protection Firms Vow to Continue Safe-Use Drive*, BUSINESSWORLD (Manila), Dec. 30, 1996, *available in* 1996 WL 14371229. While industry's expression of concern for human health effects is encouraging, the main principle being promoted by the same trade association is the importance of agrochemicals and biotechnology to develop new ones in ensuring adequate food supply for the

Establishing criteria for POPs to be covered in the agreement is a complex undertaking.[136] The debate regarding what criteria should be employed when implementing the proposed POPs convention involves two major factions.[137] On one side, representatives of the agrochemical

growing world population. *See Biotechnology Changing Crop Protection Approaches*, BUSINESSWORLD (Manila), Sept. 9, 1996, *available in* 1996 WL 11853301. These profit-motivated agrochemical companies are not primarily inclined to phase out their own products.

135. *See, e.g.*, PESTICIDE PROBLEMS, *supra* note 27, at 45; Paarlberg, *supra* note 8, at 311. Another result of pesticide use not usually addressed by the agrochemical industry is the insects' developed immunity to pesticides, making them harder and even impossible to kill. *See* CARSON, *supra* note 7, at 251-52; *New Harvests*, *supra* note 27, at 6. This can result in over-application of pesticides, which is extremely hazardous to humans. *See* Bernardo V. Lopez, *Upshot: 'Killer Bug' May Bring A National Crisis*, BUSINESSWORLD (Manila), Dec. 26, 1996, *available in* 1996 WL 14371016. Furthermore, the use of POPs in tropical locales can cause detrimental health effects in Arctic populations. PAN/CI Position Paper, *supra* note 32; *see* COLBORN, *supra* note 2, at 107-09 (noting high levels of POP contamination among Inuit people in Arctic Canada, where no known POP sources exist); POPs SUMMARY, *supra* note 1, at 2; *Experts Call for Global Action on Persistent Organic Pollutants*, GLOBAL PESTICIDE CAMPAIGNER, Sept. 1995, at 21; *see also Global Programme of Action*, *supra* note 1, at 38 (noting that evidence indicates that POPs tend to migrate to "cooler latitudes").

136. One additional controversy concerns the issue of endocrine disruption. *See supra* note 14 and text accompanying notes 14-24. Scientists and certain NGOs advocate having endocrine disruption included under the definition of "toxicity" within the proposed POPs convention. WWF POSITION PAPER, *supra* note 14, at 12. Endocrine disruption was not officially addressed at the Manila conference in June 1996. Interview with Marcia Ishii-Eiteman, *supra* note 76. At the IFCS meeting in Ottawa, Canada in February 1997, however, those attending specifically acknowledged that scientific evidence shows that POPs cause endocrine disruption and agreed that activities to address this issue should be coordinated. *Sound Management*, *supra* note 64, at 1; Memorandum from Ronald Macfarlane to Pesticide Action Network North America, *supra* note 32, at 2-3. Thus, although endocrine disruption is not explicitly mentioned in the recommendations of the Final Report from Manila, the increasing scientific evidence that endocrine disruption is a health risk as serious as carcinogens may lead to its inclusion in the future negotiations of the POPs agreement. *But see supra* and *infra* text accompanying notes 133-35, 137-45 (discussing the controversial debate regarding scientific criteria for POPs to be covered by the convention).

137. Such a division between industry and environmentalists is not limited to the POPs negotiations. *See, e.g.*, Memorandum from Ronald Macfarlane to Pesticide Action Network North America, *supra* note 32, at 3 (referring to the concern that the IFCS might become a battleground between environmental NGOs and the chemical industry). A similar debate regarding whose science is useful has occurred between developed countries and LDCs regarding the UNCED Convention on Biological Diversity, which concerns maintenance of biodiversity, biotechnology interests, intellectual property rights, and indigenous people's rights. United Nations Conference on Environment and

industry advocate the use of data from scientific laboratory testing.[138] Often chemical companies invoke science and the lack of incriminating data as a basis for their production of POPs.[139] On the other hand, LDCs and environmental NGOs support the use of health data based on actual use (e.g., on farms); these groups fear that if the lab data prevails as the standard, the result will be endless scientific studies without any progress toward the actual phaseout of harmful POPs.[140] Advocates for this position invoke the "precautionary principle," which, as explained above, holds that where threats exist of "serious or irreversible environmental damage, lack of certainty should not be used as a reason for postponing measures to prevent environmental degradation."[141] Utilizing this principle in the POPs agreement would favor imposing strict measures to reduce and prevent altogether the use of POPs, notwithstanding the fact

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Development: Convention on Biological Diversity, *opened for signature* June 5, 1992, 31 I.L.M. 822 (1992); *see* Naomi Roht-Arriaza, *Of Seeds and Shamans: The Appropriation of the Scientific and Technical Knowledge of Indigenous and Local Communities*, 17 MICH. J. INT'L L. 919, 928 (1996); *see generally* Klaus Bosselmann, *Plants and Politics: The International Legal Regime Concerning Biotechnology and Biodiversity*, 7 COLO. J. INT'L ENVTL. LAW & POL'Y 111 (1996). See David A. Wirth, *The Role of Science in the Uruguay Round and NAFTA Trade Disciplines*, 27 CORNELL INT'L L.J. 817, 837 (1994) for an analysis of what constitutes "sound science" for purposes of negotiating an international treaty affecting trade and the environment. For a discussion of scientific uncertainty and lack of data in the context of national regulation and international trade agreements see *id.* at 837-41. *See also* Kelly, *supra* note 93, at 480-81 (discussing the role of scientific uncertainty in the negotiation and implementation of international environmental agreements).

138. This faction's support of laboratory data does not refer specifically to LRTAP's criteria in particular, discussed *supra* in text accompanying notes 133-35. The chemical industry is represented at IFCS meetings by organizations such as the Groupement International des Associations Nationales de Fabricants de Produits Agrochimiques (GIFAP), an international group of trade associations of agrochemical manufacturers with members in over forty countries, including the United States. Interview with Marcia Ishii-Eiteman, *supra* note 76; *see* WHAT IS GIFAP, ANNEXE AU BULLETIN GIFAP 1 Jan.-Feb. 1987.

139. An example of the chemical industry's attitude regarding the use of POPs was provided by the President and CEO of Velsicol when his company announced that it would stop production of chlordane and heptachlor: 'We have always believed in the efficacy of these products, and the science that supports their continued use, but the economics no longer support continued manufacture.' *Velsicol Ceases Production of Chlordane and Heptachlor*, *supra* note 128, at 1.

140. Interview with Marcia Ishii-Eiteman, *supra* note 76.

141. WWF POSITION PAPER, *supra* note 14, at 13. *See supra* text accompanying notes 119-26 (discussing the "precautionary principle").

that "perfect" proof of direct harm is not available to an absolute certainty. In any case, the scientific basis for action to phase out POPs continues to be strengthened as evidence increases of the harmful effects of POPs on human health and the environment. "[N]ew discoveries [regarding human exposure to hormone-disrupting chemicals] have only heightened concern."[142]

Finally, those who favor phasing out POPs argue that the agrochemical industry introduces new synthetic chemicals into world markets without adequately testing them for potential harmful effects.[143] As Rachel Carson noted in 1962, "we have allowed these chemicals [insecticides] to be used with little or no advance investigation of their effect on soil, water, wildlife, and man himself. Future generations are unlikely to condone our lack of prudent concern for the integrity of the natural world that supports all life."[144] Indeed, the lack of data regarding the risks posed by POPs, particularly endocrine disruption, is mainly due to the lack of funding for research in this complex area.[145]

C. Special Strategies for Dioxins and Furans

Dioxins and furans are industrial byproducts, as distinguished from other POPs that are intentionally dispersed into the environment, such as pesticides.[146] These chemical contaminants are created during manufacturing processes - for example, during the creation of preservatives or pesticides, the bleaching of paper with chlorine, and the burning of fossil fuels.[147] Dioxins and furans are often found together, and like other POPs, they appear everywhere - in soil, water, air, and food - and accumulate in fat tissue.[148] Dioxin is particularly infamous as the highly toxic chemical linked to the Agent Orange controversy which stemmed from the heavy use of herbicides during the Vietnam War.[149] Dioxin has

142. COLBORN, *supra* note 2, at 139.

143. *Id.* at 138-39.

144. CARSON, *supra* note 7, at 13.

145. *Id.* at 152 (asserting that unexplored questions regarding chemical pesticides "urgently require the precise answers that only extensive research can provide, yet funds for such purposes are pitifully small."); COLBORN, *supra* note 2, at 207.

146. *Final Report*, *supra* note 32, at 11-12; COLBORN, *supra* note 2, at 113.

147. COLBORN, *supra* note 2, at 113.

148. *Id.*

149. *Id.* at 113-14.

been proven to cause several forms of cancer.[150] Other harmful effects of dioxin include immune system suppression and reproductive system damage.[151] Like DES, very low doses of dioxin may cause long-term damage to those who are exposed while in the womb or through their mother's milk.[152]

An international agreement has not yet been reached regarding the reduction or elimination of dioxins and furans.[153] The IFCS Final Report, while acknowledging the harmful effects of dioxins and furans, does not directly state that these POP byproducts should be eliminated. Furthermore, as eliminating dioxins and furans may require the use of advanced, innovative technology, it will likely be very expensive to achieve.[154] The question of who will fund the required technology and make it available to LDCs remains undetermined.[155]

Certain environmental NGOs advocate inserting provisions into the POPs agreement to require the elimination of toxic manufacturing byproducts such as dioxins and furans.[156] These NGOs contend that protocols should be established for the special treatment of dioxins and furans because of the differences in their production and use from the other POPs.[157] Nevertheless, the difficulty of accomplishing the total elimination of these industrial byproducts is widely recognized. First, so far, neither scientific technology nor NGOs have come up with appropriate alternative practices for the incineration of chlorinated compounds.[158] Second, the elimination of dioxin is further complicated by the fact that

150. *Id.*

151. *Id.* at 116.

152. *Id.* at 112-20.

153. *See Final Report, supra* note 32, at 11.

154. *See A Montreal Protocol for POPs?*, Intergovernmental Forum on Chemical Safety, at 14-15, 17, IFCS/WG.POPs.8 (June 7, 1996) (prepared by WWF, presented at the IFCS Ad Hoc Working Group On POPs meeting, June 21-22, 1996, Manila, Philippines) (on file with author).

155. Interview with Marcia Ishii-Eiteman, *supra* note 76.

156. *A Montreal Protocol for POPs?*, *supra* note 154, at 14-15; POPs BACKGROUNDER, *supra* note 48, at 4; WWF POSITION PAPER, *supra* note 14, at 11; Ishii-Eiteman, *supra* note 4, at 4.

157. WWF POSITION PAPER, *supra* note 14, at 11.

158. *See, e.g., U.S. EPA Draft Dioxin Reassessment Released,* GLOBAL PESTICIDE CAMPAIGNER, Dec. 1994, at 19 (noting the difficulty of phasing out dioxin and like compounds).

the main economic burden of such elimination would fall on developed countries rather than on LDCs.[159]

Developed countries are less likely to object to eliminating production of those POPs which have already been banned by their governments, as this would not impede their industries' ability to continue doing business as usual.[160] Eliminating dioxins and furans, on the other hand, is likely to be more controversial due to the potential costs of elimination and the fact that developed nations themselves would bear that cost.[161] As a result, it may be difficult to convince industry that the elimination of dioxins and furans is essential to the proposed POPs agreement.

D. Regional & National Measures to Control POPs

The IFCS Final Report indicates that national and regional measures should be incorporated and recognizes the "need to find, at the national level, the most effective and appropriate mix of policy instruments and measures to implement agreed international commitments."[162] Most international environmental agreements acknowledge that regional and national control measures are necessary to effective implementation of the stated goals.[163] In the case of POPs, local regulation will be essential in

159. *See A Montreal Protocol for POPs?*, *supra* note 154, at 14-15; POPs BACKGROUNDER, *supra* note 48, at 4; WWF POSITION PAPER, *supra* note 14, at 4.

160. *See* POPs BACKGROUNDER, *supra* note 48, at 4.

161. See *id.*, which states:

> Action to eliminate sources of dioxin directly threatens the perceived long-term interests of transnational chemical companies. Also, the main economic burdens associated with elimination of dioxin sources rests in powerful countries like the United States, Europe and Japan. This contrasts with other POPs where the main economic or social burden for source elimination falls on developing countries and countries with economies in transition.

162. *Final Report*, *supra* note 32, at 14; *see also id.* at 6-7.

163. *See, e.g.*, AGENDA 21, *supra* note 44, paras. 19.39(a), 19.42, 19.52, 19.54, 19.69-19.74, at 191, 193, 196; Basel Convention, *supra* note 101, arts. 3, 11, 14, 28 I.L.M. at 661, 668, 670; Montreal Protocol, *supra* note 127, art. 9, 26 I.L.M. at 1556. The Basel Convention, for example, provides for national definitions of hazardous wastes by each party to the convention, in addition to those listed in annexes to the convention, that should fall within the scope of the convention. Basel Convention, *supra* note 101, art. 3(1), 28 I.L.M. at 661. Furthermore, Article 11 of the Basel Convention provides that parties may enter into bilateral, multilateral, or regional agreements apart from the con-

order to control the use, production, transportation, and disposal of the substances covered by the proposed agreement. Because different governments are likely to enact different regulations, it will be necessary to coordinate these measures among various governmental and non-governmental agencies in order to ensure compliance with the POPs agreement's provisions.[164]

E. Potential Conflict Between Trade Interests and the POPs Agreement

Additional coordination will be needed to ensure that trade agreements and sovereignty issues will not interfere with or circumvent the provisions of the POPs agreement.[165] History demonstrates that conflicts invariably arise between trade/development interests and environmentalism.[166] Nonetheless, the two concepts do not necessarily conflict on

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vention so long as the provisions are no less "environmentally sound" than those of the convention. *Id.* art. 11(1), 28 I.L.M. at 668.

164. *See Final Report, supra* note 32, at 6-8. See generally Ibrahim F.I. Shihata, *Implementation, Enforcement, and Compliance with International Environmental Agreements—Practical Suggestions in Light of the World Bank's Experience*, 9 GEO. INT'L ENVTL. L. REV. 37 (1996) for discussion of potential barriers to effective global environmental treaties and the importance of coordination among and within states. *See also* Kelly, *supra* note 93, at 461 (asserting that, to date, UNEP has failed to coordinate global and regional environmental efforts).

165. *See generally* DUNCAN BRACK, INTERNATIONAL TRADE AND THE MONTREAL PROTOCOL (1996) (analyzing the conflicts between trade liberalization and multilateral agreements on environmental protection and the relationship between the Montreal Protocol's trade provisions and the General Agreement on Tariffs and Trade ("GATT")); Ilona Cheyne, *Environmental Unilateralism and the WTO/GATT System*, 24 GA. J. INT'L & COMP. L. 433 (1995) (discussing the potential for the World Trade Organization ("WTO")/GATT system to override environmental agreements); Schoenbaum, *supra* note 104 (discussing the issues involved in reconciling free trade interests and the GATT with agendas in favor of environmental protection); *see also generally* Kelly, *supra* note 93, at 471-80 (describing the fundamental differences between capitalism and environmentalism as obstacles to the implementation of international environmental agreements).

166. *See generally, e.g.*, Kelly, *supra* note 93; Schoenbaum, *supra* note 104. This Note does not attempt to reconcile the interaction between international trade law and environmental law and policy. It should be noted, however, that this issue will need to be addressed by the creators of an international POPs agreement. See also generally DANIEL C. ESTY, GREENING THE GATT: TRADE, ENVIRONMENT, AND THE FUTURE (1994) for a comprehensive analysis of trade issues confronting environmental movements. The drafters of the POPs convention will also need to address the question of how to deal with non-parties when their actions interfere with the purposes of the treaty. *See, e.g.*,

all issues.[167] Thus, it is feasible to impose a domestic ban on a chemical product such as a POP which still complies with the General Agreement on Tariffs and Trade ("GATT") and the World Trade Organization's ("WTO") rules.[168] If international agreement can be reached concerning the overall goal of protecting the earth's ecosystems and environment, trade agreements may be coordinated so as not to interfere with this goal.

F. Potential Emergence of a Black Market

Historically, any movement to ban material goods from world markets inadvertently results in the creation of a "black market" in the banned substances. For example, chlorofluorocarbons ("CFCs"), chemical compounds covered by the Montreal Protocol, have become a "most lucrative contraband for smugglers," producing "a growing black market."[169] Additionally, in the Philippines, banned pesticides are being successfully smuggled into the market.[170] The continued high demand

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Montreal Protocol, *supra* note 127, art. 4, 26 I.L.M. at 1554-55 (providing for control of trade with non-parties).

167. *See* Schoenbaum, *supra* note 104, at 268-69 & nn.5-7 (providing additional key sources for a comprehensive view of the arguments framing the debate between proponents of free trade and environmentalists); Shihata, *supra* note 164, at 41-42.

168. Article XX(b) of the GATT provides that bans on exports or imports are permissible where "necessary to protect human, animal or plant life or health." General Agreement on Tariffs and Trade, Oct. 30, 1947, art. XX(b), T.I.A.S. No. 1700, 55 U.N.T.S. 188, 262. For discussion of possible interpretations of this language in the context of multilateral environmental agreements, see Schoenbaum, *supra* note 104, at 273-74, 276-77; Wirth, *supra* note 137, at 820-22. As a result of the Uruguay Round of trade negotiations, the WTO was established on January 1, 1995. General Agreement on Tariffs and Trade: Multilateral Trade Negotiations Final Act Embodying the Results of the Uruguay Round of Trade Negotiations, *opened for signature* Apr. 15, 1994, 33 I.L.M. 1125, 1143-45 (1994). See Schoenbaum, *supra* note 104, at 301-02 for a discussion of the viability of the PIC regime (*see supra* text accompanying notes 71-79) under WTO rules.

169. *CFC Smuggling Growing, Says DOJ*, RECORDER (San Francisco), Jan. 10, 1997, at 6. The demand for CFCs for car air conditioners and the high cost of legal chemical substitutes has led to illegal trafficking of enormous proportions and the call for increased prosecution. Hilary F. French, *Learning from the Ozone Experience*, *in* STATE OF THE WORLD 1997: A WORLDWATCH INSTITUTE REPORT ON PROGRESS TOWARD A SUSTAINABLE SOCIETY 151, 167-68 (Lester R. Brown et al. eds., 1997).

170. *See, e.g.*, *Government Helpless Against Illegal Pesticide Influx*, BUSINESSWORLD (Manila), May 14, 1996, *available in* 1996 WL 11690607; *Gov't Urged to Monitor Distribution of Pesticides*, BUSINESSWORLD (Manila), May 10, 1996, *available in* 1996 WL 11690564; *Local Government Units Deputized to Help in Safe Use of Pesticides*, BUSINESSWORLD (Manila), Jan. 13, 1997, *available in* 1997 WL 7198146.

for the banned substances makes them prime candidates for "unscrupulous traders."[171] Thus, there is concern that the implementation of a POPs agreement will result in a similar black market trade in those chemicals banned by the agreement.

One means of deterring such a black market would be to include specific punitive measures in the POPs agreement. The 1992 Rio Earth Summit noted in Agenda 21 that no current global international agreement covers illegal international traffic in banned chemicals.[172] Agenda 21 specifically acknowledged that such black markets are harmful to human health and the environment.[173] Therefore, Agenda 21 recognized the prevention of such illegal traffic in banned chemicals as a worthy objective and suggested that concluding an international instrument to enforce restrictions on chemicals would aid in fulfilling this objective.[174] The Basel Convention's provisions regarding illegal traffic in hazardous wastes may act as a model for the drafters of the POPs agreement.[175] However, it is likely that more expansive and specific punitive measures will be required to deter potential traffickers of the banned POPs.

One method to discourage a black market in POPs would be to impose specific criminal penalties in the POPs treaty for deliberate violations.[176] Additionally, strict trade sanctions could be imposed on participating nations that fail to meet the obligations of the treaty.

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171. *Gov't Urged to Monitor Distribution of Pesticides*, *supra* note 170; *see also Better Alternatives*, *supra* note 6, at 5.

172. AGENDA 21, *supra* note 44, para. 19.66, at 195. *See also* Patlis, *supra* note 107, at 211 (stating that there is no international mechanism to enforce the mandate for states to regulate activities within their jurisdictions in order to prevent pollution across borders).

173. AGENDA 21, *supra* note 44, para. 19.66, at 195.

174. *Id.* paras. 19.39(d), 19.66, 19.67, at 191, 195. Agenda 21 also recognized that cooperative efforts among national governments would be necessary to prevent international traffic. *Id.* paras. 19.69-19.74, at 196.

175. Basel Convention, *supra* note 101, art. 9, 28 I.L.M. at 666-67. The convention provides that the parties shall cooperate to ensure that the substances in question are disposed of as soon as possible in an environmentally sound manner. *Id.* art. 9(4), 28 I.L.M. at 667. Further, the convention provides that each party "shall introduce appropriate national/domestic legislation to prevent and punish illegal traffic." *Id.* art. 9(5), 28 I.L.M. at 667.

176. Another means of deterring illegal trafficking of POPs will be to introduce and make available practical, affordable alternatives. *See supra* note 169; *see also infra* text accompanying notes 177-83 (discussing the debate regarding POPs alternatives).

Furthermore, specific enforcement measures should be included in the POPs agreement to ensure that the signatories abide by the agreement's terms. For example, close monitoring of labeling of POPs being imported or exported should be required. Finally, the agreement should specify a judicial forum to address violations and settle disputes among member states.

F. Chemical versus Non-Chemical Alternatives to POPs

The chemical industry has an interest in promoting the use of chemicals rather than non-chemical practices as alternatives to the POPs being phased out under the agreement.[177] On the other hand, environmental NGOs prefer non-chemical alternatives to chemical substitutes because of the danger that the substituted chemicals may be as harmful as the chemicals they replace.

Two examples of non-chemical agricultural alternatives are (1) sustainable agriculture and (2) integrated pest management. "Sustainable agriculture" involves minimizing environmental impact with low chemical inputs while maintaining farm profitability.[178] NGOs work with farmers around the world to promote and develop sustainable methods that will meet current consumption needs without destroying resources needed for the future.[179] The FAO has advocated "integrated

177. Environmental NGOs, on the other hand, advocate the use of "not in kind alternatives" (i.e., changing the types of processes that involve and produce POPs) in order to eliminate POPs. *See, e.g., A Montreal Protocol for POPs?*, *supra* note 154, at 10 (defining "not in kind alternatives" for CFCs). *Cf. supra* text accompanying notes 154-61 (regarding the impracticability of eliminating sources of dioxins and furans).

178. No absolute definition of sustainable agriculture exists. JULES N. PRETTY ET AL., SUSTAINABLE AGRICULTURE IMPACTS ON FOOD PRODUCTION AND CHALLENGES FOR FOOD SECURITY 6 (1996); WORLD RESOURCES INSTITUTE, AGRICULTURAL POLICY AND SUSTAINABILITY: CASE STUDIES FROM INDIA, CHILE, THE PHILIPPINES AND THE UNITED STATES 1-2 (Paul Faeth ed., 1993) [hereinafter "SUSTAINABILITY"]; WORLD RESOURCES INSTITUTE, NEW PARTNERSHIPS FOR SUSTAINABLE AGRICULTURE 8 (Lori Ann Thrupp ed., 1996) [hereinafter "NEW PARTNERSHIPS"].

179. *See generally* PRETTY, *supra* note 178; NEW PARTNERSHIPS, *supra* note 178; SUSTAINABILITY, *supra* note 178 (providing case studies in several countries). For example, one organization in the Philippines, Integrated Community Development Assistance Incorporated, organizes and promotes sustainable agriculture through ecological pest management and non-chemical fertilizing techniques, as well as by utilizing multicropping instead of monocropping. *See* Prime P. Sarmiento, *Food Basin in the Makin'*, BUS. DAILY, Dec. 4, 1996, *available in* 1996 WL 14104114.

pest management" ("IPM") in Southeast Asia for more than five years.[180] IPM uses a combination of biological, environmental, genetic, and chemical control methods such as crop rotation and mixture of crops; management of habitat to reduce pests; selection and development of plants with resistance to specific pests and diseases; and measures to improve soil fertility.[181] Under IPM, chemicals are used only as a last resort.[182] The benefits of IPM include increased crop yield (dispelling the myth that chemicals are necessary in order to feed the world), reduction in total production costs, reduced health risks to farmers and consumers, reduced risk of major pest outbreaks, and preservation of biodiversity in the environment.[183]

180. *ASEAN Aggie Ministers Pushing for Reduced Use of Farm Pesticides*, BUSINESSWORLD (Manila), Aug. 29, 1996, *available in* 1996 WL 11852698. Agenda 21 from the 1992 UNCED Rio Earth Summit suggests IPM as one alternative to the use of toxic pesticides in agriculture. AGENDA 21, *supra* note 44, para. 19.45, at 192. Additionally, the Asian Development Bank recently endorsed an environment-friendly pest management program by approving a loan for its introduction in Indonesia. *See ADB Approves 44 Million Dollar Loan for Indonesia*, AGENCE FRANCE-PRESSE, Sept. 26, 1996, *available in* 1996 WL 12146005. Only recently did IPM receive official support from nations in Southeast Asia. *See ASEAN Aggie Ministers Pushing for Reduced Use of Farm Pesticides*, *supra*. In the Philippines, for example, IPM has been "successfully" implemented as the country's response to the Agenda 21 mandate for sustainable agriculture. *DA's IPM Program Reports Gains*, BUSINESSWORLD (Manila), Nov. 18, 1996, *available in* 1996 WL 11857013; *Pesticide Producers Endorse Use of Integrated Pest Management*, BUSINESSWORLD (Manila), Oct. 28, 1996, *available in* 1996 WL 11856010. IPM is a practice introduced as one of the steps toward truly sustainable agriculture.

181. *Pesticide Producers Endorse Use of Integrated Pest Management*, *supra* note 180. See generally C.A.B. INTERNATIONAL & ASIAN DEVELOPMENT BANK, INTEGRATED PEST MANAGEMENT IN THE ASIA-PACIFIC REGION (1992) for a regional overview of IPM.

182. *Pesticide Firms Recycle Bottles*, BUSINESSWORLD (Manila), Jan. 2, 1997, *available in* 1997 WL 7197517; *Pesticide Producers Endorse Use of Integrated Pest Management*, *supra* note 180.

183. *Department of Agriculture Program to Train Farmers in New Technology*, BUSINESSWORLD (Manila), Sept. 17, 1996, *available in* 1996 WL 11853674.

V. Comparison of the Current POPs Proposal to the Montreal Protocol

A. *Similarities*

Many parallels can be drawn between the situation addressed by the 1987 Montreal Protocol[184] (namely, the depletion of the ozone layer by emissions of CFCs, halons, and other ozone depleting substances) and the current issues faced by those attempting to curtail the harmful effects of POPs. The problems presented by both POPs and ozone depleting substances are global in cause and impact.[185] Many nations have agreed that concerted international action is required to protect human health and the environment against the adverse effects of POPs and ozone depleting substances ("ODS").[186] These countries also agree that international measures are necessary to control the production and dissemination of POPs and ODS and that controlling these substances and products containing them has a significant effect on international trade and the

184. Montreal Protocol, *supra* note 127, 26 I.L.M. 1541. The Montreal Protocol was negotiated as a protocol to the Vienna Convention for the Protection of the Ozone Layer. *Id.*; United Nations: Vienna Convention for the Protection of the Ozone Layer, Mar. 22, 1985, 26 I.L.M. 1516 (1987) [hereinafter "Vienna Convention"]. The Vienna Convention, as the starting point for international action to curtail the depletion of the ozone layer, articulates the general obligations of the parties. Vienna Convention, *supra*, 26 I.L.M. 1516. The Montreal Protocol, which has been amended several times, provides specifics regarding the timing, methods of compliance, and substances to be controlled. Montreal Protocol, *supra* note 127, 26 I.L.M. 1541; *see generally A Montreal Protocol for POPs?*, *supra* note 154; *Some Relevant Aspects of the Montreal Protocol*, Intergovernmental Forum on Chemical Safety, IFCS/WG.POPs.2 (June 7, 1996) (paper prepared by UNEP, presented at the IFCS meeting in Manila, Philippines, June 21-22, 1996) (on file with author) [hereinafter "*Relevant Aspects*"]. Much literature exists regarding the depletion of the ozone layer and the Montreal Protocol and its implications. *See, e.g.*, RICHARD ELLIOT BENEDICK, OZONE DIPLOMACY: NEW DIRECTIONS IN SAFEGUARDING THE PLANET (1991); BIERMANN, *supra* note 108, at 21-42, 102-06; JACK FISHMAN & ROBERT KALISH, GLOBAL ALERT: THE OZONE POLLUTION CRISIS (1990) [hereinafter "GLOBAL ALERT"]; ARJUN MAKHIJANI & KEVIN R. GURNEY, MENDING THE OZONE HOLE: SCIENCE, TECHNOLOGY, AND POLICY (1995) [hereinafter "MENDING THE OZONE HOLE"]; Edward A. Parson, *Protecting the Ozone Layer*, *in* INSTITUTIONS FOR THE EARTH 27-73 (Peter M. Haas et al. eds., 1993).

185. *Relevant Aspects*, *supra* note 184, at 1.

186. Montreal Protocol, *supra* note 127, 26 I.L.M. at 1550-51; *Final Report*, *supra* note 32, at 6, 14. Additionally, control measures can be applied to production and consumption of either ODS or POPs.

economies of all nations.[187] Additionally, parties to the Montreal Protocol and those attending the POPs negotiations acknowledge the need for special provisions in order for less developed countries to meet their obligations under the instrument.[188]

Finally, POPs and ODS are similar in that regardless of the particular source of an individual POP or ODS, its long-term adverse effects are spread throughout the environment. Substances that deplete the ozone layer eventually reach the stratosphere.[189] Similarly, POPs do not break down, but rather travel across land and oceans and ultimately accumulate in living organisms and their offspring.[190] In short, use of POPs on one continent may affect the environment of another continent.[191] Because both ODS and POPs have *global* effects, the solution to their curtailment must be global as well.

B. The Montreal Protocol as a Prototype for a POPs Agreement

The Montreal Protocol set a precedent as a concerted international initiative to confront a global environmental crisis; therefore, it may serve as a model for the POPs agreement.[192] It has been suggested that

187. Montreal Protocol, *supra* note 127, 26 I.L.M. at 1550-51; *Final Report*, *supra* note 32, at 1-2, 6, 14; *see also Relevant Aspects*, *supra* note 184, at 4-5; POPs BACKGROUNDER, *supra* note 48, at 4.

188. Montreal Protocol, *supra* note 127, arts. 5, 9, 10, 26 I.L.M. at 1551, 1555-57; *Final Report*, *supra* note 32, at 6-8, 14.

189. GLOBAL ALERT, *supra* note 184, at 44-45; J.G. Anderson et al., *Free Radicals Within the Antarctic Vortex: The Role of CFCs in Antarctic Ozone Loss*, 251 SCIENCE 39, 45 (1991).

190. *Global Programme of Action*, *supra* note 1, at 37-38; COLBORN, *supra* note 2, at 105; POPs BACKGROUNDER, *supra* note 48, at 3; POPs SUMMARY, *supra* note 1, at 1-2.

191. *See supra* note 135 (regarding POPs' effects in the Arctic).

192. *See, e.g.*, COLBORN, *supra* note 2, at 218-19; French, *supra* note 169, at 151-53; Ronnie D. Lipschutz & Ken Conca, *The Implications of Global Ecological Interdependence*, *in* THE STATE AND SOCIAL POWER IN GLOBAL ENVIRONMENTAL POLITICS 327, 334 (Lipschutz & Conca eds. 1993); Pamela Wexler, *Protecting the Global Atmosphere: Beyond the Montreal Protocol*, 14 MD. J. INT'L L. & TRADE 1 (1989); David Hurlbut, Note, *Beyond the Montreal Protocol: Impact on Nonparty States and Lessons for Future Environmental Protection Regimes*, 4 COLO. J. INT'L ENVTL. L. & POL'Y 344, 344-45 (1993); Patlis, *supra* note 107, at 193. For a discussion of the development of the Montreal Protocol, see French, *supra* note 169, at 151-71. See also generally BIERMANN, *supra* note 184, at 26-42; MENDING THE OZONE HOLE, *supra* note 184, at 224-27; Patlis, *supra* note 107, for discussion of the Montreal Protocol's control measures and amendments thereto. A thorough evaluation of the effectiveness of the Montreal Protocol is beyond

like the Montreal Protocol, the proposed instrument to curtail POPs should identify principles with the understanding that protocols will be developed to deal with specific targeted substances within agreed upon timetables.[193] Additionally, the POPs convention should include, as does the Montreal Protocol, special flexible provisions for LDCs, including a reasonable timeframe for LDCs to adjust their practices.[194] Finally, certain funding measures of the Montreal Protocol demonstrate a method by which liability is imposed generally on developed nations without making any one nation or group liable *per se*.[195]

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the scope of this Note. A portion of this Note, rather, attempts to discuss some aspects of the Montreal Protocol relevant to the process of developing an international legally binding instrument regarding POPs.

193. *A Montreal Protocol for POPs?*, *supra* note 154, at 3.

194. *See* Montreal Protocol, *supra* note 127, art. 5, 26 I.L.M. at 1555-56; *Final Report, supra* note 32, at 6-8, 14. There is an inevitable tension between LDCs and industrialized countries in the negotiation of an environmental treaty. *See, e.g.*, Lipschutz & Conca, *supra* note 192, at 334; Wexler, *supra* note 192, at 15-17; Hurlbut, *supra* note 192, at 344. While the Montreal Protocol may be lauded for its recognition of the special needs of LDCs, its provisions, particularly with regard to the implementation of financial mechanisms, have been criticized for the actual results. *See generally* STEVE KRETZMANN, MONEY TO BURN: THE WORLD BANK, CHEMICAL COMPANIES AND OZONE DEPLETION (Greenpeace 1994); Patlis, *supra* note 107. A thorough discussion of the structure of the financial mechanisms provided for under the Montreal Protocol is beyond the scope of this Note. However, it should be noted that one of the most significant criticisms of the Multilateral Fund established under the Montreal Protocol is that its administration has been co-opted by the chemical industry. Indicative of this claim is the fact that a disproportionate amount of funds have gone toward the production and use of alternative chemicals, rather than non-chemical alternative practices. *See A Montreal Protocol for POPs?*, *supra* note 154, at 10. *See also supra* and *infra* text accompanying notes 177-83, 196-99 (discussing the debate between redesigned processes and chemical substitutes).

195. Montreal Protocol, *supra* note 127, 26 I.L.M. 1541. Under the terms of the Montreal Protocol, monies are redistributed from countries that have benefited from the production of the environmentally hazardous substances being phased out to LDCs that have not benefited. Patlis, *supra* note 107, at 211-12. Liability is not directly imposed with a mandate of compensation for past harm. Rather, the Protocol seeks to deter future harm through an assistance scheme. *Id.* at 209, 212-13. One observer notes that the distinction between compensation and assistance is only one of semantics. *Id.* However, such a distinction plays a significant practical role in international relations by mitigating the potential antagonism between states that would be caused by cooperation based on the threat of liability as opposed to cooperation based on the common interest in protecting the global ecosystem. *Id.* The latter form of cooperation is essential to the forming of an international legally binding agreement. *Id.* at 212-13.

On the other hand, the Montreal Protocol does not provide a useful model for dealing with the controversy regarding the use of non-chemical versus chemical substitutes for POPs. Under the Montreal Protocol, the ODS-producing industry has been able to co-opt the funding mechanism in order to replace the banned substances with substitute chemicals.[196] In the case of POPs negotiations, the chemical industry would like to follow this model by replacing banned POPs with chemical substitutes so that they can continue to profit from their production of such chemicals.[197] However, many scientists and policy makers argue that the proposed POPs convention should encourage *non-chemical* alternatives to those practices currently being employed.[198] These participants argue that if chemical substitutes are accepted as a means of phasing out targeted POPs, the whole purpose of the POPs agreement could be frustrated and a new hazard created by merely substituting one environmental threat with another.[199]

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196. In the case of ODS, the chemical industry was able to create a market for its new products through use of the funding provided for under the Montreal Protocol. *A Montreal Protocol for POPs?*, *supra* note 154, at 14.

197. Interview with Marcia Ishii-Eiteman, *supra* note 76.

198. *A Montreal Protocol for POPs?*, *supra* note 154, at 13-14; COLBORN, *supra* note 2, at 225-30; *see also supra* text accompanying notes 177-83 (discussing the debate regarding alternatives to POPs). As noted above, the Montreal Protocol makes significant allowances for substitute chemical substances to promote the phaseout of ODS. *See supra* note 196; *see also infra* note 199. Because industry cooperation was essential to the success of the Montreal Protocol, such allowances are not surprising. In the case of POPs, however, the impetus behind non-chemical substitutes is encouraging. *See Final Report*, *supra* note 32, at 10; *see also supra* text accompanying note 60.

199. The nine pesticides on the current "dirty dozen" list of POPs (aldrin, dieldrin, DDT, endrin, chlordane, hexachlorobenzene, mirex, toxaphene, and heptachlor) are chemical compounds known as organochlorines. *Better Alternatives*, *supra* note 6, at 3; *see also* MARION MOSES, DESIGNER POISONS, HOW TO PROTECT YOUR HEALTH AND HOME FROM TOXIC PESTICIDES 41, 43-44 (1995) (describing chlorinated hydrocarbon pesticides, also known as organochlorines) [hereinafter "DESIGNER POISONS"]; STEINGRABER, *supra* note 9, at 112-14 (discussing the chemical composition, modes of action, and effects of certain organochlorines); *Pesticides*, *supra* note 9, at 482. See *supra* text accompanying note 54 for a list of the twelve POPs. Environmental NGOs such as PAN fear that even if the POPs convention halts the production of these pesticides, chemical companies will replace them with toxic pesticides of the organophosphate, carbamate, or pyrethroid family. Interview with Marcia Ishii-Eiteman, *supra* note 76. Organophosphates and carbamates are acutely toxic compounds which attack the brain and nervous system but do not accumulate in the body; these pesticides are known as nerve-gas type pesticides and are considered more acutely toxic than organochlorines. *Better Alternatives*, *supra* note

One major difference between the Montreal Protocol and the current POPs negotiations lies in the structure of the chemical industries involved. In the case of the Montreal Protocol, the ODS-producing industry is dominated by a mere handful of representatives; thus, it has been able to exercise considerable influence in the debate regarding whether chemical substitutes should be used.[200] In contrast, POPs are produced by a vast and diverse array of manufacturers;[201] therefore, it may not be

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6, at 7; DESIGNER POISONS, *supra*, at 44-47; *Pesticides*, *supra* note 9, at 481-82. A German company introduced the first organophosphate poisons (nerve gases) during World War II by testing them on prisoners in concentration camps. STEINGRABER, *supra* note 9, at 94. Pyrethroids are compounds that also attack the brain and nervous system but are usually less toxic than organophosphates and carbamates; they do not accumulate in the body but may cause vomiting, diarrhea, tremor, irritability, or severe reactions in people with asthma. DESIGNER POISONS, *supra*, at 47-48. Thus, the health risks posed by potential chemical substitutes are no less severe than those of the listed POPs.

In the case of the Montreal Protocol, the parties initially agreed to phase out the production of chlorofluorocarbons (CFCs). Montreal Protocol, *supra* note 127, 26 I.L.M. 1541. In later amendments, however, the parties agreed to phase out hydrochlorofluorocarbons (HCFCs), the primary substitutes for CFCs, due to scientific evidence that they, too, depleted the ozone layer. Copenhagen Amendments, *supra* note 127, 32 I.L.M. 874; *see* BIERMANN, *supra* note 108, at 34-35; MENDING THE OZONE HOLE, *supra* note 184, at 224-27 (discussing the scheduled phaseouts under the Montreal Protocol, as amended). Hydrofluorocarbons (HFCs) are another family of chemical substitutes for CFCs and have been found to contribute to global climate change, resulting in efforts to reduce emissions in the United States. *See* Barbara A. Boczar, *Avenues for Direct Participation of Transnational Corporations in International Environmental Negotiations*, 3 N.Y.U. ENVTL. L.J. 1, 29-30; *Climate Change: Clinton Says Plan Will Create Jobs, Cut Deficit, Protect Environment*, 17 CHEM. REG. REP. 1326 (1993); *Ozone Depletion: Tensions Between Ozone Protection, Climate Change Emerging in Policy*, 17 CHEM. REG. REP. 1320 (1993). For a chart demonstrating the uses and potential environmental effects of certain CFCs, HCFCs, and HFCs, see BENEDICK, *supra* note 184, at 16-17.

200. *See* BIERMANN, *supra* note 108, at 65 (stating that "[i]n the case of the ozone regime, ninety-five per cent of all chlorofluorocarbon production occurred under the jurisdiction of only four actors . . . ."); *see also supra* note 196 and accompanying text (describing the chemical industry's influence over the Montreal Protocol's Multilateral Fund).

201. The agrochemical industry is dominated by a handful of companies. *See* THE PESTICIDE TRAIL, *supra* note 29, at 25 (stating that in 1992 fifteen companies controlled 86% of the global pesticide market and in 1993 twelve controlled 75%). However, POPs do not consist of pesticides alone. Dioxins and furans, for instance, are industrial byproducts that span various industries. *See supra* text accompanying notes 146-47. Additionally, although there may be a handful of powerful chemical companies in developed countries who dominate production of certain POPs, when a particular substance is banned in some countries, it is very common for private pesticide formulators to emerge in LDCs where no enforced ban exists and sell them directly to farmers. Paarlberg, *supra*

as easy for those industry interests to exert influence in favor of chemical substitutes.[202] It is an open question as to whether the diversity of the chemical production market will be a positive or negative factor in negotiating the POPs agreement.

Some view the debate between chemical substitutes and non-chemical alternatives as a debate between a plan motivated by short-term profit and one that looks toward long-term solutions.[203] Given the competing interests involved, it remains to be seen which type of substitutes will be advocated in the final draft of the POPs agreement.[204]

VI. Conclusion

POPs continue to harm the health of humans, animals, and the environment and pose a major threat to global biodiversity. Further research is needed to identify how POPs operate, to add additional POPs to the list of harmful substances, and to determine how the world can best protect itself against the dangers posed by POPs. In recognition of the mounting evidence regarding the harmful effects of POPs, major international steps are now being taken to address the problem. The concerted international commitment to curtailing and eliminating the POPs threat is demonstrated by the recent agreement reached at the IFCS meeting in Manila, followed by UNEP's adoption of the IFCS's recommendations. The next step will be to establish the negotiating committee (INC), which is scheduled to begin drafting the POPs instrument in early 1998.

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note 8, at 311-12. *See also supra* text accompanying notes 169-71 (discussing a potential black market in banned POPs); *supra* text accompanying notes 28-33 (demonstrating the incidence of exports of banned substances to LDCs).

202. *But see supra* note 199 (regarding potential chemical substitutes, which remain a dangerous possibility).

203. *See, e.g.*, Boczar, *supra* note 199, at 30 (asserting that the problems of chemical alternatives employed by manufacturers as a result of the Montreal Protocol could have been avoided if the negotiators of the agreement had agreed to develop alternatives that would be useful in the long run).

204. *See Final Report*, *supra* note 32, at 9-10. Although the Final Report implies that non-chemical alternatives might be preferable to chemical alternatives that may harm human health and the environment, this issue is likely to be a major negotiating point at the INC sessions. *Id.* at 10; Telephone Interview with Marcia Ishii-Eiteman, *supra* note 61; *see supra* text accompanying note 60.

Formulating the appropriate multilateral approach to the POPs problem remains controversial. Various outstanding issues must be addressed in order to create an effective agreement, particularly those dealing with allocating responsibility among industrialized and less developed nations, scientific criteria and measures to add to the list of the "dirty dozen," and alternatives to POPs. To this end, certain elements of the Montreal Protocol, both its successes and its perceived failures, may be a useful model for the proposed POPs agreement.

The momentum generated by the IFCS recommendations, if acted upon expeditiously by the world community, may lead to the successful phasing out of harmful POPs. The agreements reached thus far are encouraging and point toward the creation of an international convention to phase out POPs that will be legally binding on the parties.

Thirty-five years ago, the subject of the alarming effects of man-made chemicals on the environment and human health was eloquently brought to public attention by Rachel Carson in *Silent Spring*.[205] Although the debate as to the extent of the damage caused by POPs is likely to continue for some time, the consequence of doing nothing is a risk that no one is willing to take, for it is a gamble on our future.

205. *See generally* CARSON, *supra* note 7.